ELECTRICAL REVIEW

BICC CABLES

for all wiring installations

publications on all types are available on request

BRITISH INSULATED CALLENDERS CABLES LIMITED
BLOOMSBURY STREET LONDON W.C.1

Some examples of Mica, Paxolin Laminated, Panilax Laminated and Empire Varnished Tapes from our wide manufacturing range. To the large scale fabrication of insulating materials we bring long experience and extensive facilities.

m and i

THE MICANITE & INSULATORS CO. LTD

EMPIRE WORKS · BLACKHORSE LANE · WALTHAMSTOW · LONDON · E.17

BRANCH OFFICES at BIRMINGHAM · CARDIFF · GLASGOW · MANCHESTER and NEWCASTLE-UPON-TYNE and representatives in most countries throughout the world. In CANADA, MICANITE CANADA LTD.

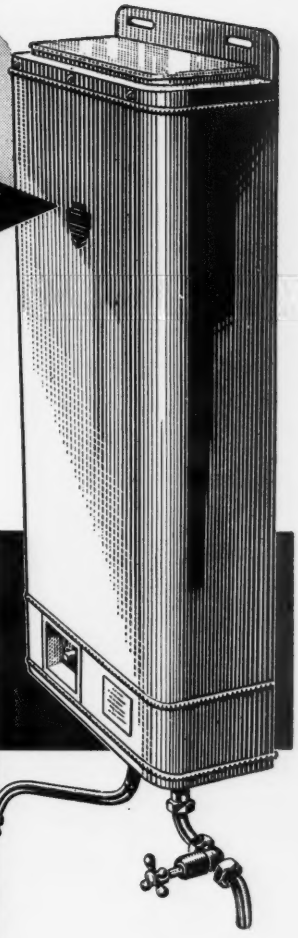
Manufacturers of MICANITE (Built-up Mica Insulation). Fabricated and Processed MICA. PAXOLIN Laminated Materials. PANILAX Laminated Materials and Mouldings. EMPIRE Varnished Insulating Cloths and Tapes. HIGH VOLTAGE BUSHINGS & TERMINALS. Distributors of Micoflex-Duratube Sleevings, Micoflex-Durasleeve (Plastics-covered flexible metal conduit) and Kenutuf Injection Mouldings (in most thermoplastics including P.V.C.)

Simplicity—

the Hallmark of Genius

Heatrae

REGISTERED TRADE MARK



electric water heaters

Heatrae type S.E.B. Electric Water Heater is intended for occasional use in the bathroom. It is especially designed to provide a quick supply of hot water. Once switched on, the heater can be left for successive baths, as thermostatic control removes any danger of boiling.

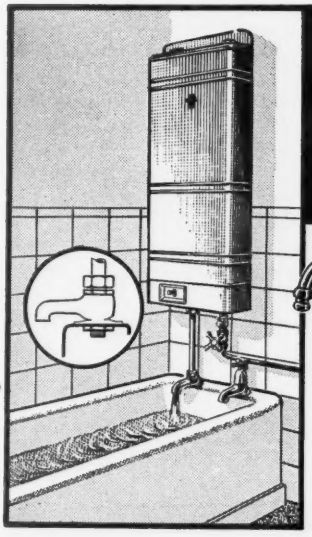
The **S.E.B.** is beautifully finished in white enamel with chromium plated fittings. Rectangular in shape, it occupies minimum space.

Capacity: 12 *gallons.*

This is one of a wide range of Heatrae Electric Water Heaters.

There is a standard type available to meet almost any set of working conditions.

Please send us details of your requirements and we will make you the most suitable offer.



so simple to **install**

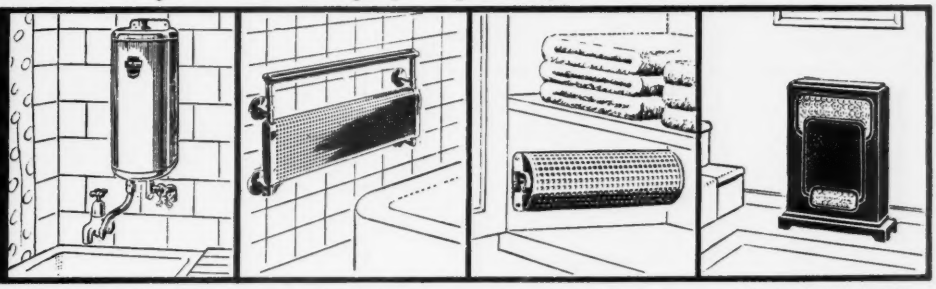
so simply **serviceable**

are so simple...

Heatrae

30 years specialised experience in designing and manufacturing of Electric Water Heaters

Here are some of the extensive range of our products for industrial and domestic uses . . .



• D.O.T. ELECTRIC WATER HEATER • AIR WARMER/TOWEL RAIL • AIRING CUPBOARD HEATER • ELECTRIC AIR CONVECTOR

Advertisement issued by HEATRAE LTD · NORWICH · ENGLAND

Manufacturers of: Electric Water Heaters, Oil Heaters, Immersion Heaters, Urns, Towel Rails, Airing Cupboard Heaters, Flameproof Heating Apparatus, Breakfast Cookers, Electric Fires, Food Trolleys, Warming Plates, Air Heaters.

CRYSELCO

INDUSTRIAL *Lighting Fittings*

Featuring

★ STANDARD MODEL HAS DETACHABLE REFLECTOR

★ ALTERNATIVE DETACHABLE OVERLAMP REFLECTOR

★ COOL WIRING HEADS AVAILABLE

★ ALL REFLECTORS VITREOUS ENAMELLED INSIDE AND OUT

★ EASY INSTALLATION AND MAINTENANCE

★ COMPETITIVE PRICES

SEND FOR OUR FITTINGS LEAFLET TO-DAY!

OUR LIGHTING ADVISORY SERVICE WILL ASSIST YOU WITH YOUR LIGHTING PROBLEMS

CRYSELCO LIMITED · KEMPSTON WORKS · BEDFORD

Branches BIRMINGHAM · BRISTOL · BURY ST EDMUNDS · CARDIFF · GLASGOW · LEEDS · LEICESTER
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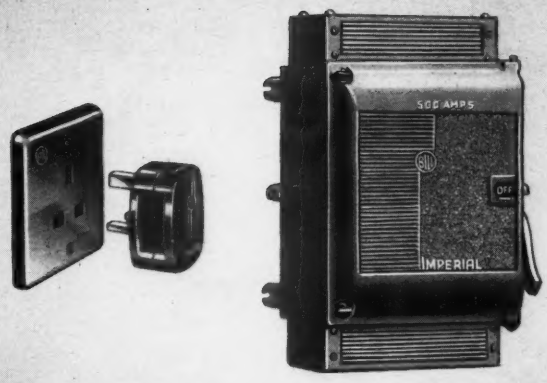
BILL — YOU CANNOT BUY BETTER GEAR

You cannot buy better gear



BILL COMPLETE RANGE
13 AMP SOCKET OUTLET TO 500 AMP FUSE SWITCH

★ SOCKET OUTLETS
★ COOKER SWITCHES
★ DISTRIBUTION BOARDS
★ SWITCHES AND SWITCH FUSES
★ INDUSTRIAL PANELS

BILL SWITCHGEAR LTD.
ASTON LANE · PERRY BARR
BIRMINGHAM·20

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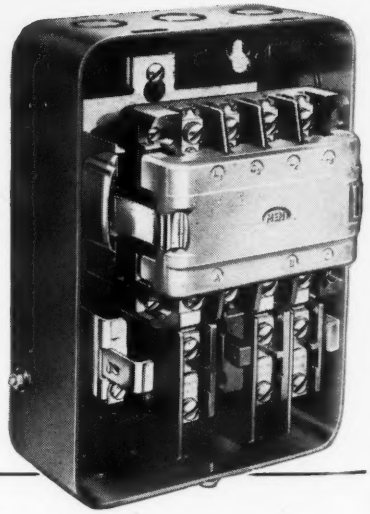
THE FINEST PROTECTION A MOTOR CAN HAVE...

THE NEW MEM *Autoline* STARTERS 1½ to 15 h.p.

Do you want the finest possible starter for valuable machine tools and other vital applications? Then here is your answer from MEM, the people with more than 30 years experience in large scale production of motor control gear. The "Autoline" is new from start to finish, and is designed for high reliability and long life

Send for "Autoline" Brochure List No. 347



- *Unit construction to meet a wide range of needs from standard units.*
- *Precision overload relays.*
- *One starter for either auto or manual resetting.*
- *Especially easy installation and maintenance.*
- *Complies with performance requirements of BS 587 and the Canadian Standards Association.*

MEM

MIDLAND ELECTRIC MANUFACTURING CO. LTD., TYSELEY, BIRMINGHAM 11. *Branches in London and Manchester*

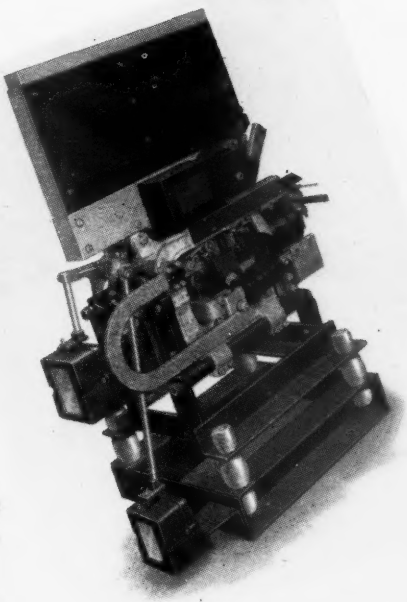
B T-H

ELECTRICAL EQUIPMENT

for the

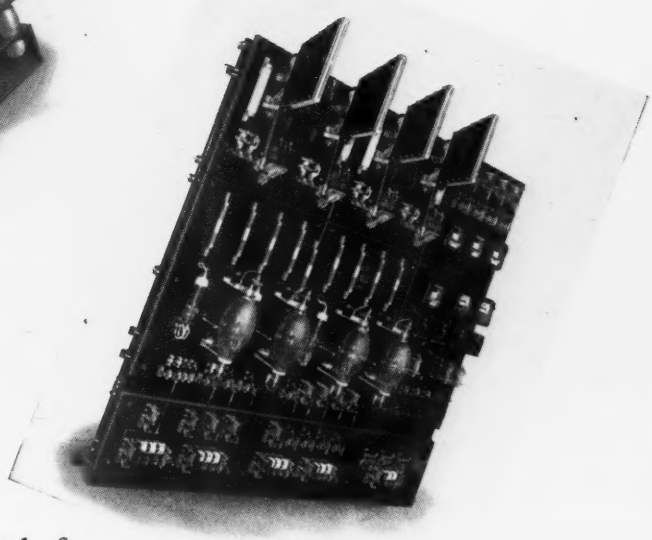
Manchester-Sheffield-Wath
Electrification Scheme

British Thomson-Houston have supplied —to the order of Messrs. Bruce Peebles — the following railway substation equipment :—



BTH type RJR high-speed circuit breaker.

139 — D.C. high-speed circuit-breakers and associated control cubicles for rectifier, feeder, and track sectioning duties.



4 — Multi-stage electronically-actuated resistance units for control of line voltage during regenerative braking— believed to be the first installation of its kind in railway service in this country.

Electronic regenerative braking panel.

BRITISH THOMSON-HOUSTON

THE BRITISH THOMSON-HOUSTON COMPANY LIMITED · RUGBY · ENGLAND

Member of the AEI group of companies

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Crofts

MACHINE CUT GEARS

SPURS. Up to 15ft. dia., 6″ Pitch, 30″ Face

HELICALS. Up to 15ft. dia., 4″ Pitch, 30″ Face

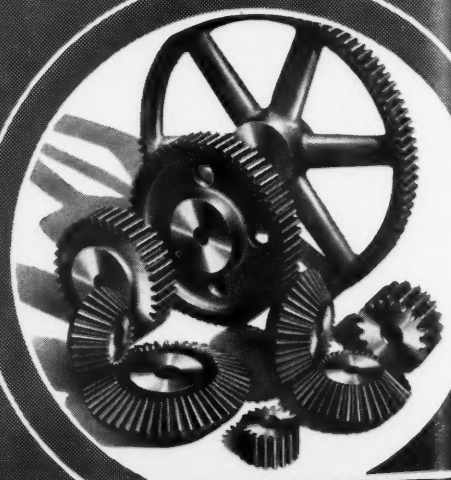
BEVELS and MITRES. Up to 90″ dia.

SPIRAL BEVELS and MITRES. Up to 60″ dia.

WORMS & WHEELS. Up to 104″ dia., 3½″ Pitch

INTERNALS. Up to 96″ dia., 2″ Pitch, 8″ Face

FOLDER 547/9

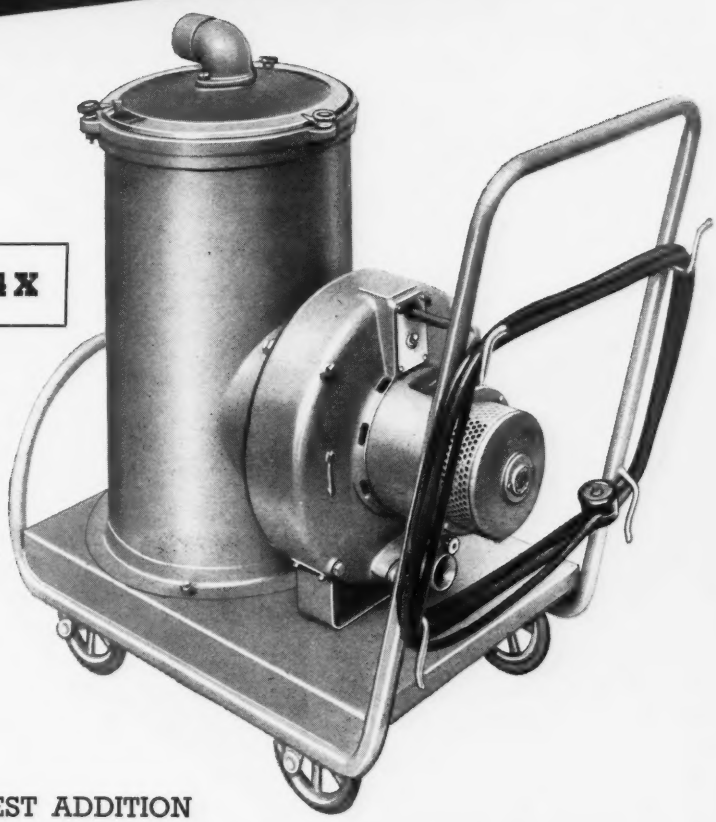


Crofts (ENGINEERS) LIMITED. BRADFORD 3. ENGLAND

PHONE :- 65251 (15 LINES) GRAMS :- "CROFTERS BRADFORD"

another Sturtevant

THE NO. 4X



THIS LATEST ADDITION to our wide range of industrial vacuum cleaners is an exceptionally efficient general purpose machine. Special features of design, including a removable metal bin for containing swarf, fine powder and granular materials apart from ordinary dust, dirt and grit, makes it particularly suited for a host of industrial dust collecting duties. It has an exceptional performance for its size, and stands supreme in VOLUME — VACUUM — VALUE. Write to-day to our reference U.101/26 for particulars.

STURTEVANT ENGINEERING CO., LTD.
Southern House · Cannon Street · London · E.C.4

ASTA certified

The Association of Short Circuit Testing Authorities (ASTA) issues Certificates of Rating for fuses giving satisfactory performance when tested in accordance with the appropriate clauses of British Standard 88.

The complete range of 'ENGLISH ELECTRIC' Type 'T' High Rupturing Capacity Non-Deteriorating Cartridge Fuse Links has been A S T A certified for Category of Duty 440AC4 to the 1939 edition of B.S.88 (the highest category at that time) and for Categories of Duty 440AC4 and 440AC5 representing 25MVA and 35MVA respectively to the 1947 edition of B.S.88.

RATING AMPS.	LIST NOS.	ASTA CERTIFICATE NUMBERS		
		B.S.88: 1939	B.S.88: 1947	
		440 AC 4	440 AC 4	440 AC 5
30	TIA30	617	1016	2074
60	TIS60	616	903	2022
100	TC100	615	932	2021
200	TF200	251	933	2033
300	TKF300	252	934	2032
400	TM400	629	935	2031
500	TT500	354	936	2025
800	TLT800	353	2098	2026

'ENGLISH ELECTRIC'

h.r.c. fuse links

See also our Industrial Motors advertisement in this issue

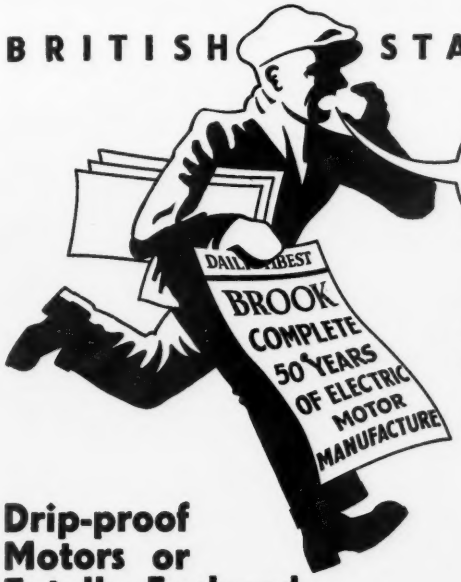
THE ENGLISH ELECTRIC COMPANY LIMITED, QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

Fusegear Works, East Lancashire Road, Liverpool, 10

WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL · ACCRINGTON

F.7

BRITISH STANDARD DIMENSIONS



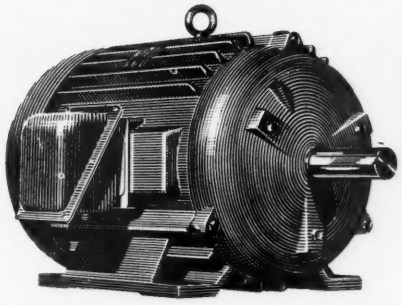
News for motor users!

AN OFFER EXCLUSIVE TO BROOK MOTORS

Drip-proof Motors or Totally Enclosed Fan Cooled Motors

BOTH COMPLY FOR OUTPUT AND DIMENSIONS WITH BRITISH STANDARD 2083: 1954

Send for full details of Fan Cooled and Drip-proof types in List 789.



Complete interchangeability between Drip-proof and Totally Enclosed types.

Drip-proof type offers the advantage of lower cost.

Rating from 0.5 to 25 h.p.

Flange mounting types can be offered.

Send a postcard now and a copy will be forwarded without obligation.

BROOK MOTORS Ltd

HUDDERSFIELD • ENGLAND

I.NG. 308

Protection saves more than it costs!

You can SEEM to save money by buying a poor raincoat, but think of your health—and maybe your suit! Once you've ruined those your purchase ceases to be a bargain. Similarly, you CAN buy indifferent packing papers and thereby save on costs at the expense of your products . . . but who wants to do that?

There's permanent security in 'Carco' Protective Packing Papers, for every packing has been evolved scientifically to give maximum resistance against some specific threat —Rust . . . corrosion . . . damp . . . contamination, and so on. Each paper is laboratory controlled during manufacture and tested before despatch.

We cut and slit papers to customers' requirements and can supply in sheets, rolls and strips as required.

A.I.D. APPROVED

The following papers are supplied to Government specifications:

WATERPROOF PAPER
KRAFT WRAPPING PAPER
WAX KRAFT PAPER
MOULDABLE WAX PAPER
GREASE RESISTANT PAPER
CREPE PAPER
CREPE KRAFT UNION
GUMMED PAPER TAPES
CORRUGATED PAPER

The 'Carco' range of packings includes Kraft Union Waterproof Papers, Industrial Waxed Papers, Industrial Crepe Krafts and Kraft Laminates, Corrosion resisting Papers. 'Carcotape' Industrial Gummed Tapes.

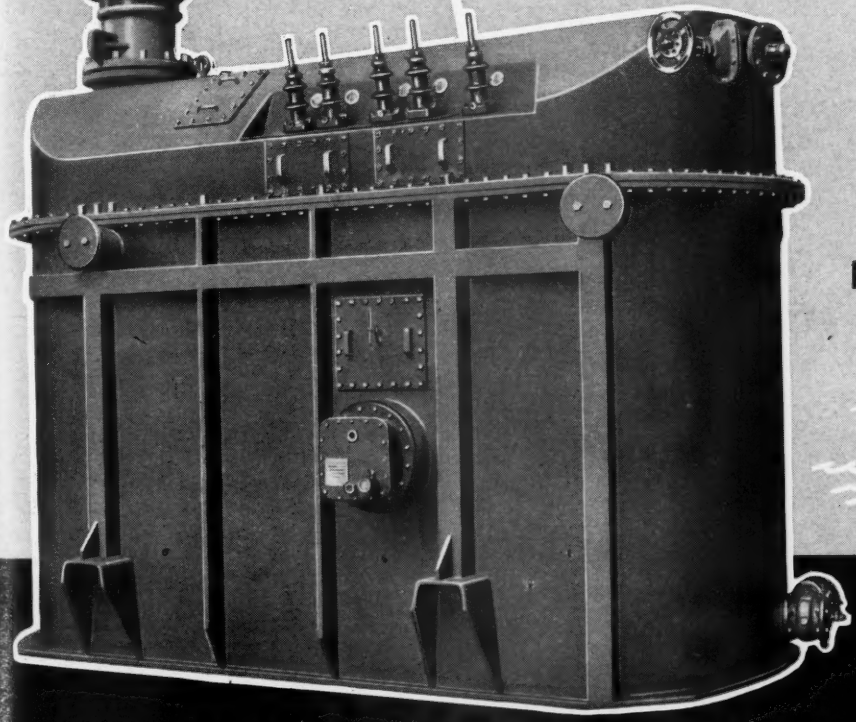
Carco
PROTECTIVE PACKING PAPERS

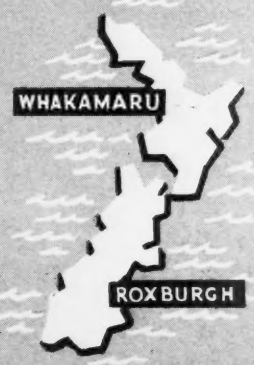
Carco PROTECTIVE PACKING PAPERS

CARR & CO. (PAPER) LTD., Shirley, Birmingham *Tel.: SHIrley 2215*
LONDON: 20, Dover Street, Mayfair, W.1 (Tel.: MAYfair 3591) **PARIS: 59, Rue de Chateaudun (Tel.: Trinité 77-73)**
Sole agents and stockists for South Wales Area: **George A. Stevenson Ltd.,** Burrows Chambers (P.O. Box No. 2), Swansea, South Wales

26 FERRANTI 220kV POWER TRANSFORMERS for NEW ZEALAND

The State Hydro-Electric Department of New Zealand has ordered 26 Ferranti Large Power Transformers.
13—14,800 kVA, single-phase, 50 cycles, 11/220 kV Transformers forming 4—44,400 kVA 3-phase banks have already been supplied to ROXBURGH.
13—9,259 kVA, single-phase, 50 cycles, 11/220 kV Transformers forming 4—28,777 kVA 3-phase banks will eventually be supplied to WHAKAMARU.





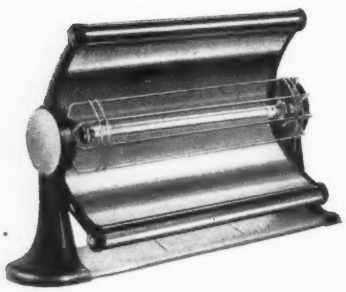
FERRANTI

FERRANTI LTD · HOLLINWOOD · LANCS
London Office: KERN HOUSE, 36, KINGSWAY, W.C.2

FT.145

For easy selling

Attractively designed, strongly made, reasonably priced and extensively advertised, these six fires will sell like hot cakes when the buying season reaches its peak.

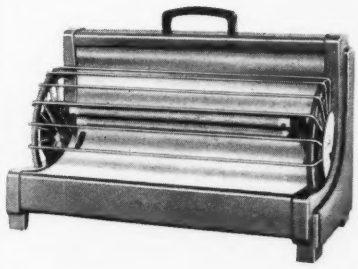


SOLRAY

No. 151 1kW size £5.5.3. inc. tax
No. 152 2kW size £6.7.2. inc. tax
Finish: Cream and Black

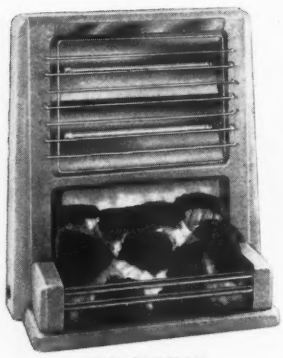
CHAMPION

No. 91A ¾kW size £4.17.1. inc. tax
No. 92A 1½kW size £5.12.9. inc. tax
No. 83A 2¼kW size £6.14.0. inc. tax
Finish: Light Bronze



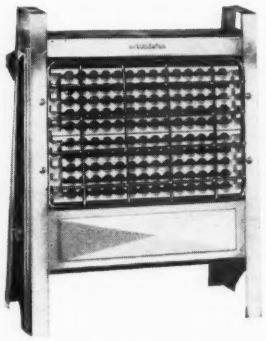
HOTSPUR

No. 141 1kW size £3.11.9. inc. tax
No. 142 2kW size £4.13.0. inc. tax
Finishes: Silver, Silver Green, Silver Bronze.



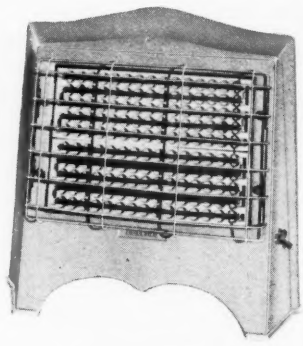
PRINCESS

2kW SIZES:
No. 212 (with coal) £11.6.11. inc. tax
No. 212A (with logs) £13.18.10. inc. tax
3kW SIZES:
No. 213 (with coal) £12.11.6. inc. tax
No. 213A (with logs) £15.3.5. inc. tax
Ripple Finishes: Bronze, Silver Green, Silver.



DINKIE

No. 601 1kW size £2.6.6. inc. tax
No. 602 2kW size £3.8.4. inc. tax
Finishes: Silver, Silver Green, Silver Bronze.



EMPIRE

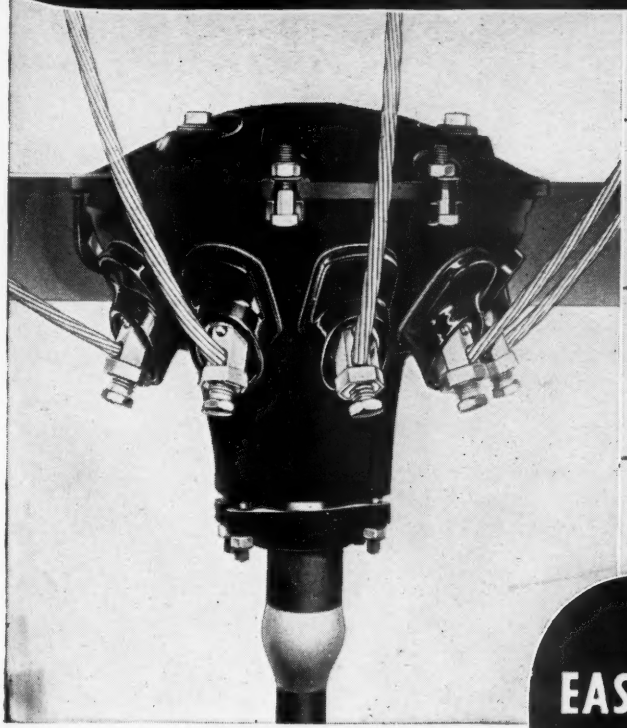
No. 401E 1kW size £2.12. 0. inc. tax
No. 402E 2kW size £4. 7. 6. inc. tax
No. 403E 3kW size £5.14.10. inc. tax
Finishes: Brown or Beige Vitreous Enamel.

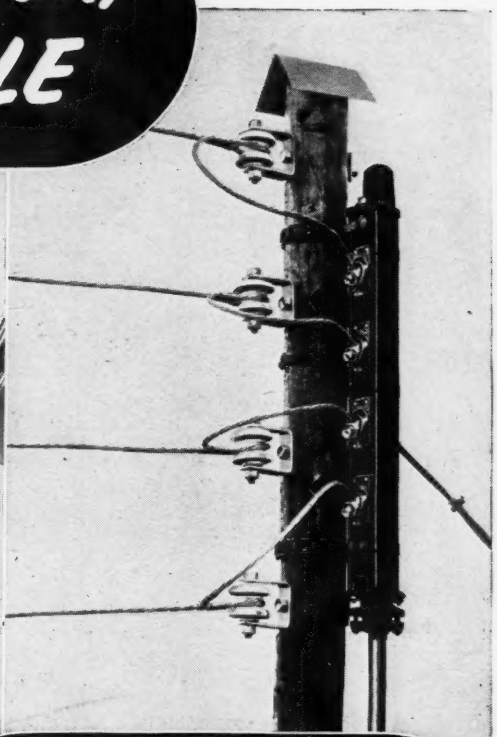
you can't beat a "Belling"

BELLING & COMPANY LIMITED BRIDGE WORKS, ENFIELD, MIDDX HOWARD 1212

CRC 418

JOINTING IS QUICK, SIMPLE, RELIABLE



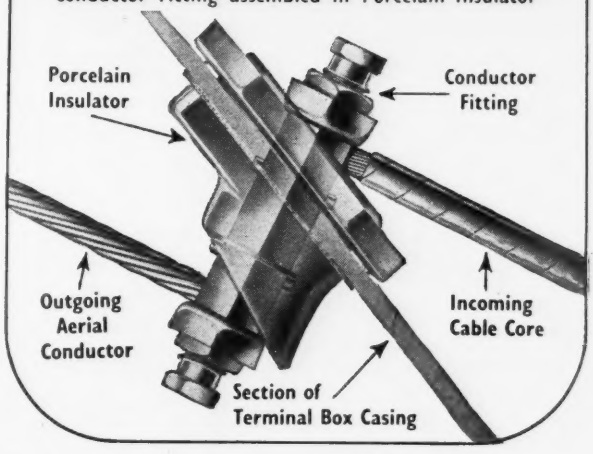


HENLEY low tension terminal boxes for pole mounting include: TIER TYPE for line conductors arranged in vertical formation, and INVERTED TYPE for conductors arranged in horizontal or similar formation.

Please write for Catalogue 50, giving full details of the complete range.

Note this EASY JOINTING FEATURE

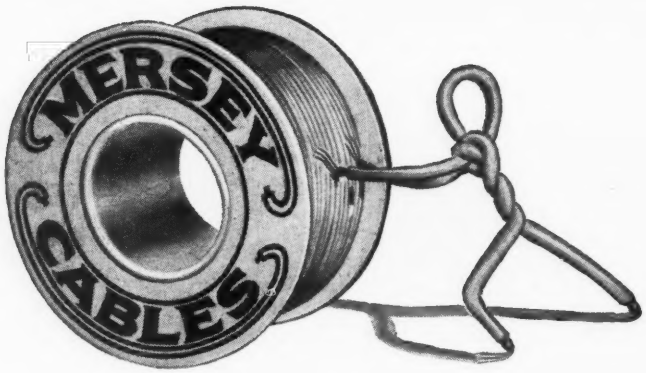
Ghosted illustration showing tinned brass Conductor Fitting assembled in Porcelain Insulator



HENLEY

OUTDOOR TERMINAL BOXES

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD., 51-53 HATTON GARDEN, LONDON, E.C.1



THE MARK OF QUALITY

for

RUBBER AND THERMOPLASTIC INSULATED WIRES, CABLES AND FLEXIBLES

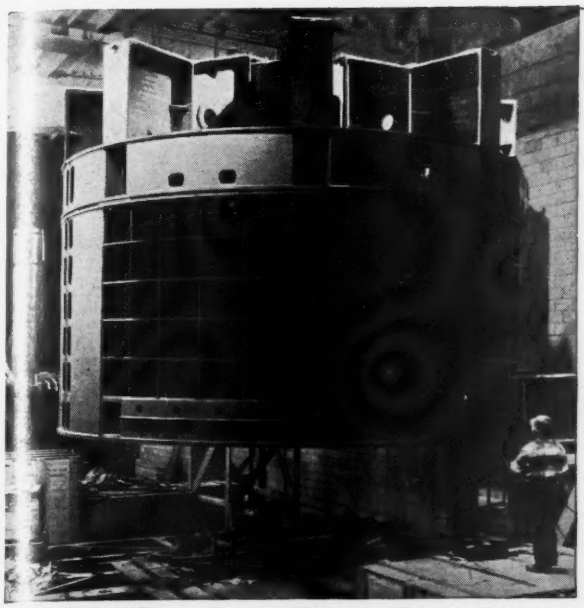
MERSEY CABLE WORKS LIMITED

LINACRE LANE · BOOTLE · LIVERPOOL, 20

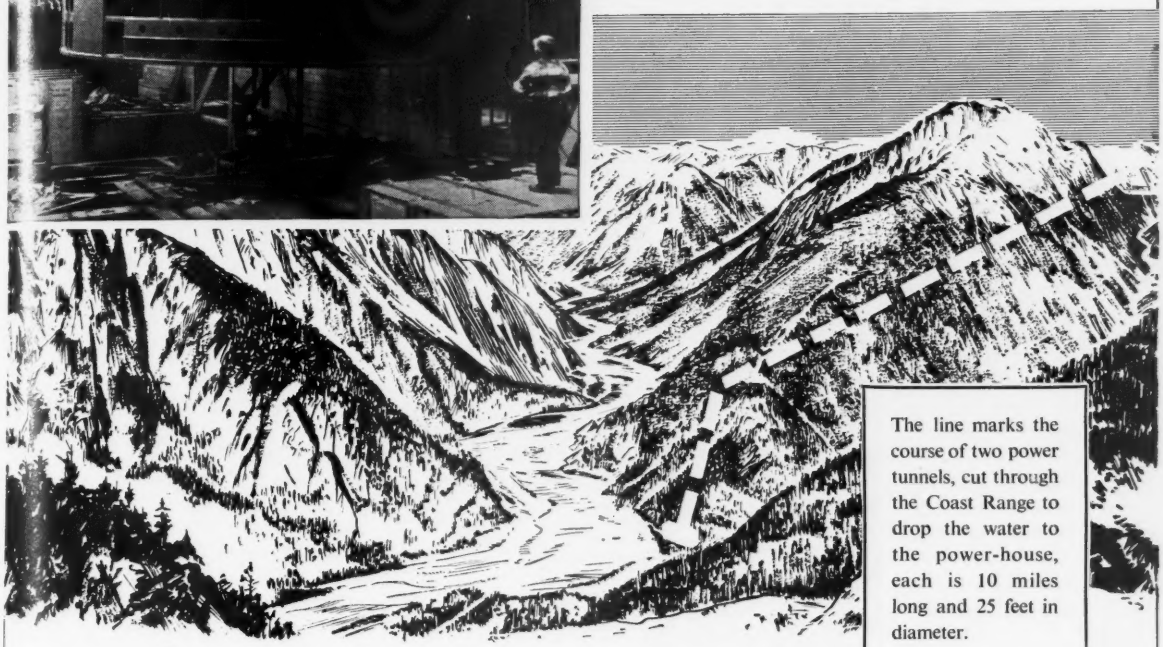
Telephone: BOOTLE 4111 (4 lines)

Telegrams: MERCABLES LIVERPOOL, 20

A TI COMPANY



A POWER HOUSE IN A MOUNTAIN



The line marks the course of two power tunnels, cut through the Coast Range to drop the water to the power-house, each is 10 miles long and 25 feet in diameter.

The Kitimat project of the Aluminium Company of Canada plans eventually for an annual production of 500,000 metric tons of aluminium, requiring electrical power equivalent to 1,650,000 h.p. The initial stage of this scheme, comprising 450,000 h.p. is completed. The ENGLISH ELECTRIC Company's contribution to this first stage is a 105,000 kVA alternator. This is one of the largest water-turbine-driven alternators built in Great Britain, and was delivered well ahead of schedule.
A 213,000 kVA bank of transformers has been supplied by the ENGLISH ELECTRIC Company of Canada.

'ENGLISH ELECTRIC'
water wheel generators

THE ENGLISH ELECTRIC COMPANY LIMITED, QUEENS HOUSE, KINGSWAY, LONDON, W.C.2
Offices and representatives throughout the world.

HE.1714

TRANSFORMERS

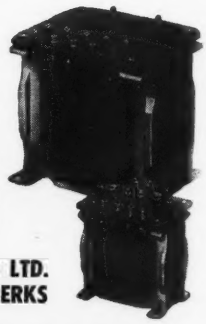
for POWER, DISTRIBUTION and ELECTRONIC APPLICATIONS

RANGES from small ELECTRONIC TYPES, up to 50 kVA, orthodox and C cores. 1 PHASE and 3 PHASE OIL and AIR COOLED PHASE CONVERSION, etc

Special Types for **FURNACE** *and* **RECTIFIER CONTROL**

NITROGEN FILLED 5 kVA TRANSFORMER as supplied to:
A.E.R.E. HARWELL

H.T. and L.T. TRANSFORMERS for power supply of R.F. Heating Equipment as supplied to:
RADIO HEATERS LTD. WOKINGHAM, BERKS



A.I.D. and A.R.B. APPROVED

Your enquiries are invited

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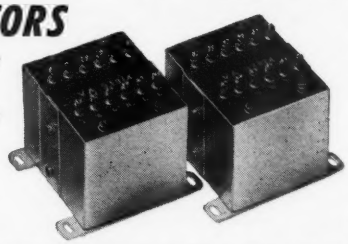
READING *Phone: READING 71763*

TRANSDUCTORS

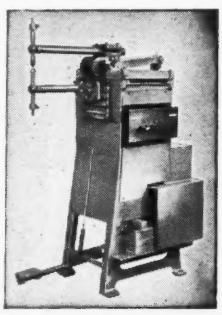
AS MANUFACTURED FOR:
THE ENGLISH ELECTRIC CO. LTD.



NEW MOTOR DRIVEN AUTOMATIC SPOT WELDER

NO AIR
NO ELECTRONICS
NO EFFORT

(Patent applied for)

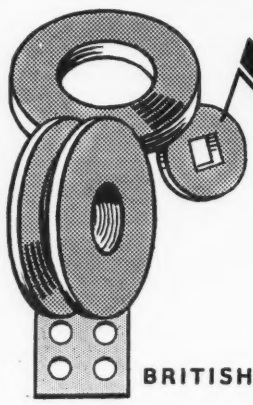


For repetition or intermittent welding at high speed with wide time control.

Immediate response to pedal but impossible to make incomplete weld cycle.

SOLE MAKERS:

THE WESTMINSTER ENGINEERING CO. LTD.
VICTORIA ROAD, LONDON, N.W.10. Phone: ELGar 7372/3



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BRITISH MICA Co LTD · BEDFORD

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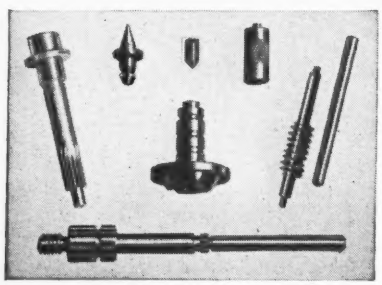

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Metway Works
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• BRITAIN'S LARGEST MAKERS OF THERMOSTATIC CABLES

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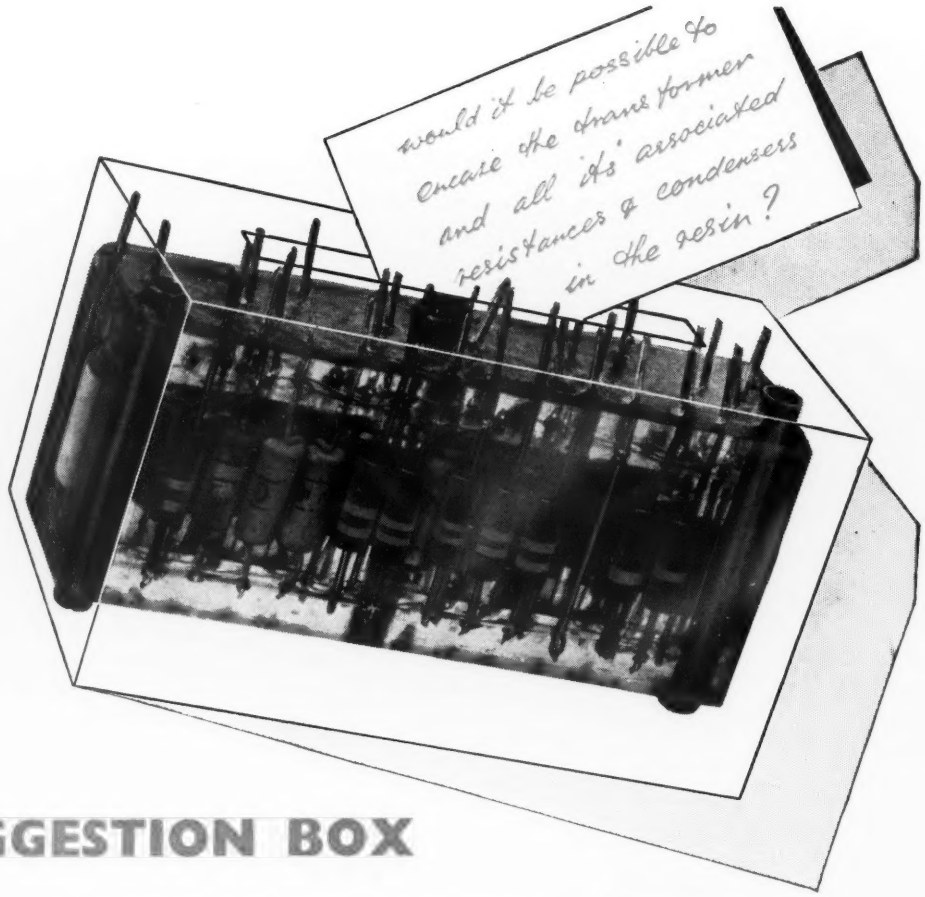

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Take a closer look at this! It may be full of suggestions for solving *your* problems. An intricate electronic circuit is embedded in BAKELITE Polyester Resin, SR.17449—the grade specially recommended for 'potting' circuits.

This resin has not only exceptionally high resistance to shock but it also protects delicate components from heat, humidity and corrosion. It is one of a group of BAKELITE Polyester Resins whose many different properties are being used in a wide range of applications.

It may be that this suggests ways in which Polyester Resins could be of service to you. If so, please 'phone or write to Bakelite Limited, who will be delighted to give you every assistance in following up new ideas.

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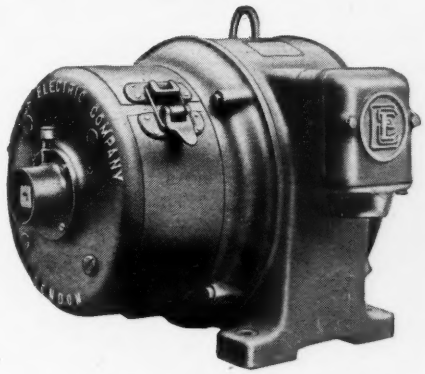
P.67

Electric Drive for Cranes

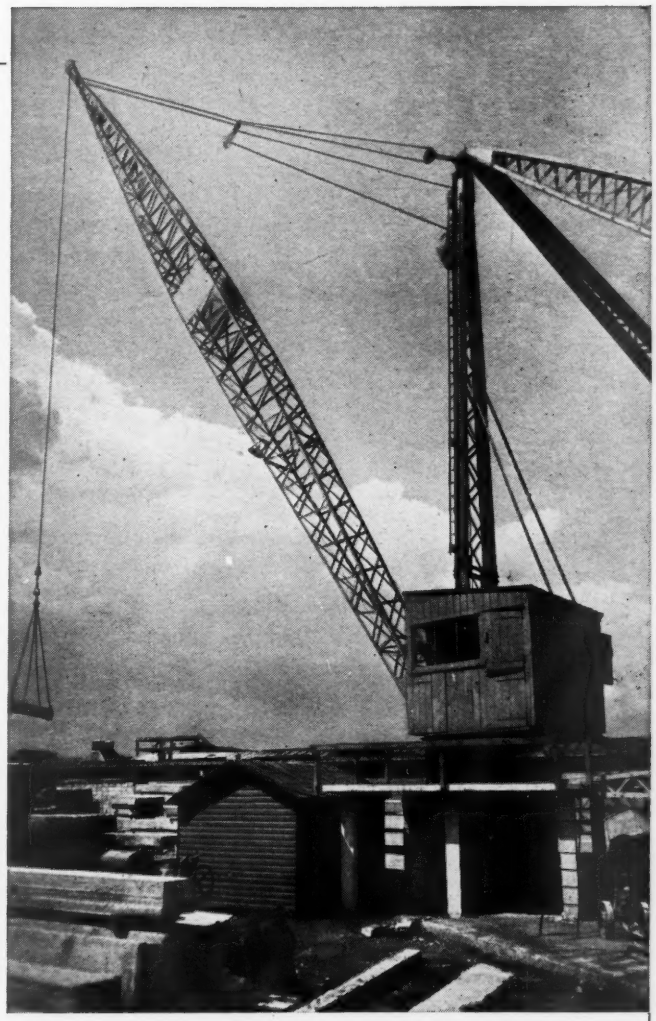
The 'ENGLISH ELECTRIC' KKS totally enclosed slip ring induction motors have been designed especially for crane and similar duties demanding the highest degree of reliability.

Although particularly robust, the motors are of compact design. Low centre height enables them to be mounted in any position on the crane.

In addition to cranes, 'ENGLISH ELECTRIC' KKS motors are ideal for capstans, hoists, winches, haulage gears, coke crushers and similar power-driven plant.



'English Electric' type KKS crane motor



'ENGLISH ELECTRIC'

industrial motors

See also our Fuse links advertisement in this issue

THE ENGLISH ELECTRIC COMPANY LIMITED, QUEENS HOUSE, KINGSWAY, LONDON, W.C.2.

Industrial Motor Works, Bradford

WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL · ACCRINGTON

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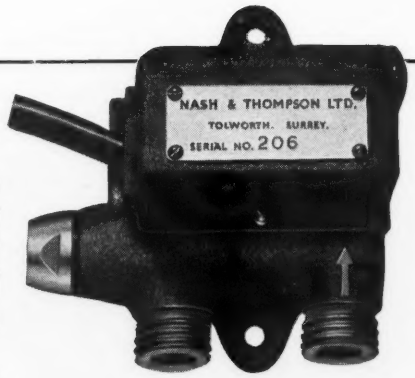
ON GUARD

24 hours a day . . . .

FLOW CONTROLLED SWITCHES



Protect your equipment with a Nash & Thompson Flow Controlled Switch. This device can be used for a number of purposes, such as the prevention of over-heating in liquid cooling circuits or the automatic starting and stopping of pumping machinery when the liquid flow falls below or rises above limiting values.

These Switches make or break an electrical circuit when liquid flow moves outside preset limits. Three models are offered covering operative flows from 0.25 to 30 gallons per minute. They are robustly constructed, simple to install and maintain and trouble-free in operation. If desired they can be supplied flame-proof to Buxton Certificate standard for gas groups 1, 2 and 3.

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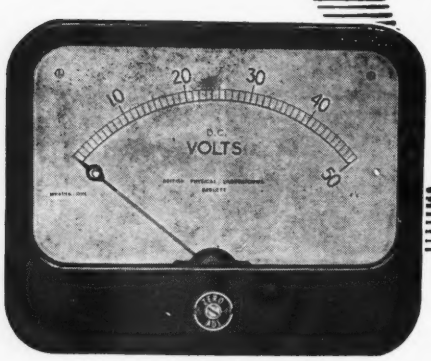
Nash and Thompson
LIMITED

OAKCROFT ROAD • TOLWORTH • SURREY • ELMBRIDGE 5252
WHG. NT/21

Rectangular Pattern

SWITCHBOARD METER



Early deliveries available of all types.

Flush mounting type meter of contemporary styling available for moving coil and moving iron meters, for any range. Scale sizes 6″, 9″ and 12″. Standard round patterns available with 4″, 6″ and 8″ dials.

We welcome your enquiries and will forward prices and full details of our unique range on request.

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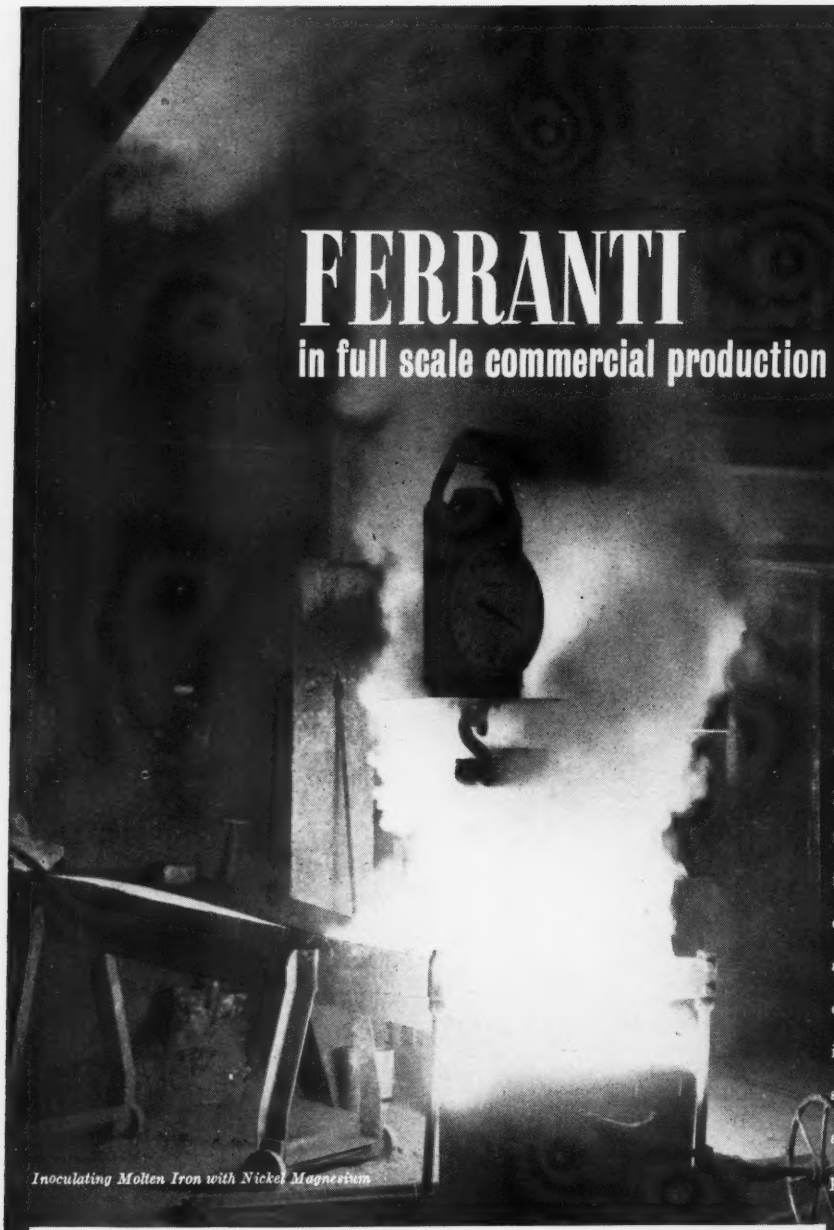
The Ferranti Foundry is in full scale commercial production of S.G. (Spheroidal Graphite) Iron, including NOduMAG an austenitic non-magnetic type. Ferranti S.G. Iron with its excellent castability and remarkable physical properties has found many applications in several industries notably textile engineering, agricultural machinery and electrical engineering, in most cases showing appreciable saving in cost. Ferranti S.G. Iron can be supplied either 'as cast', fully annealed or heat treated to suit particular applications.



Inoculating Molten Iron with Nickel Magnesium

PHYSICAL PROPERTIES OF S.G. IRON

PROPERTY	S.G. IRON		NOduMAG
	AS CAST	*ANNEALED (FERRITIC)*	*AS CAST*
ULTIMATE TENSILE TONS/SQ. INS.	40-45	28-35	25-30
YIELD POINT TONS/SQ. INS.	25-35	20-25	18-22
ELONGATION %	3-5	20-25	10-13
REDUCTION IN AREA %	4-5	21-25	14-16

The above table shows average figures arrived at after taking independently conducted tests over a long period.

Ferranti S.G. IRON and NOduMAG are manufactured under licence from the MOND NICKEL CO.

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These three leaflets fully describe the wide range of standard DALY electrolytic capacitors. In general, the types listed will cover most requirements. Where specifications outside this range must be met, however, DALY will design and make special units to meet specific needs.

Behind DALY capacitors there lies 20 years of making only electrolytics, highly specialised experience which engineers throughout the world are finding invaluable, and which is readily available to you.

We shall be happy to send you copies of these leaflets without obligation.

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ELECTROLYTIC CAPACITORS

CONDENSER SPECIALISTS FOR OVER 20 YEARS

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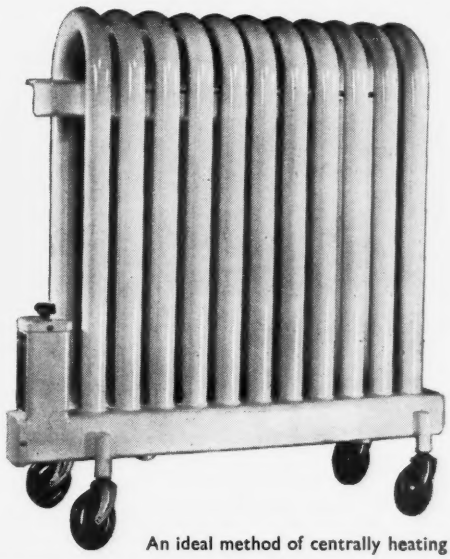

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PORTABLE
ELECTRIC
CENTRAL
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WARMTH
WHERE and WHEN YOU WANT IT

An ideal method of centrally heating any home with minimum of installation and maximum control without attention.

● **HEAT CONTROL.** *Adjustable 3-way.* ● **SAFETY.** *Oil contained in hermetically sealed pipes — cannot overheat.*
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The OCEAN heater gives all-round radiation and maintains an even temperature, instantly adjustable to suit personal comfort. **The OCEAN** is completely safe — the oil-filled steel tubes are heated by easily accessible electric immersion element. All voltages A.C.

The OCEAN is made in three sizes and retails at the following prices:

Size 1.	720 watts.	List Price **£15. 17. 0** + P.T. £5. 16. 6
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Enquire through your usual wholesaler or direct to:—

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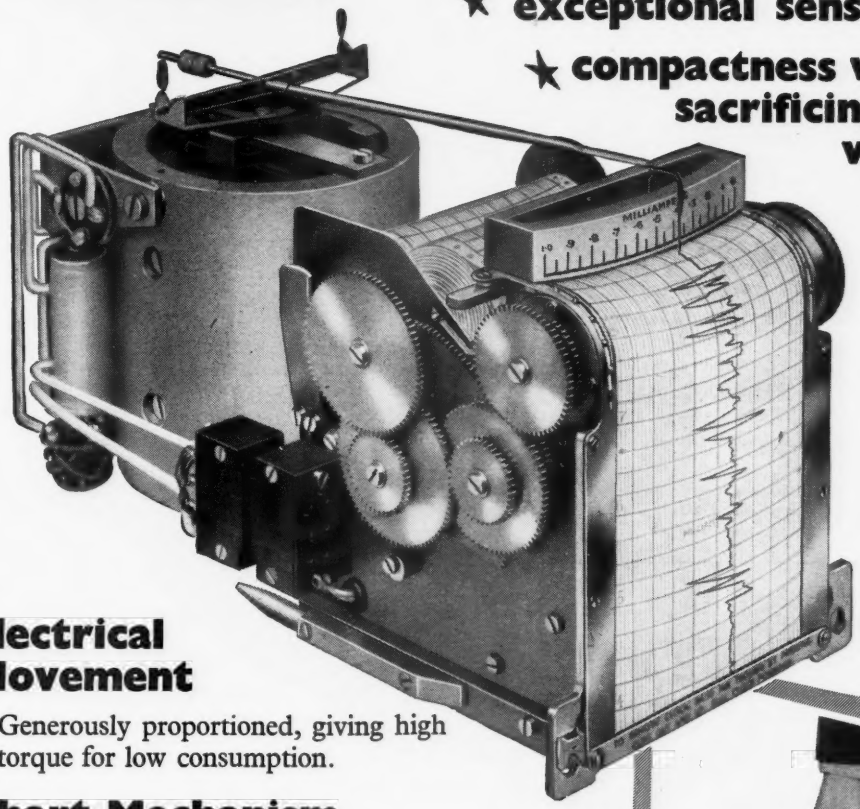

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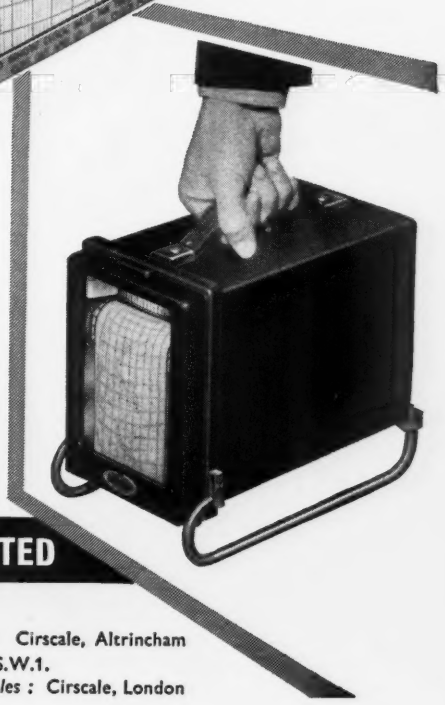

THE RECORD ELECTRICAL COMPANY LIMITED

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Telephones : Altrincham 3221 (4 lines) *Telegrams and Cables:* Cirscale, Altrincham

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- 5 sizes from 25 to 150 watts and 1 ohm to 10,000 ohms
- Available in multi-ganged units with any combination of ohmic values

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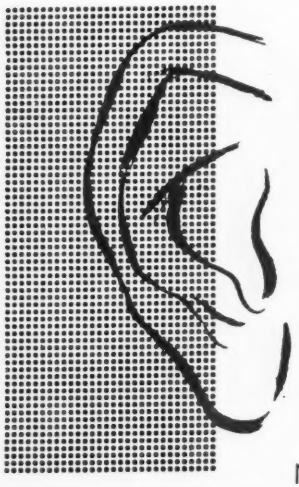

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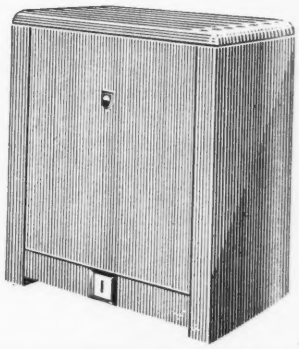

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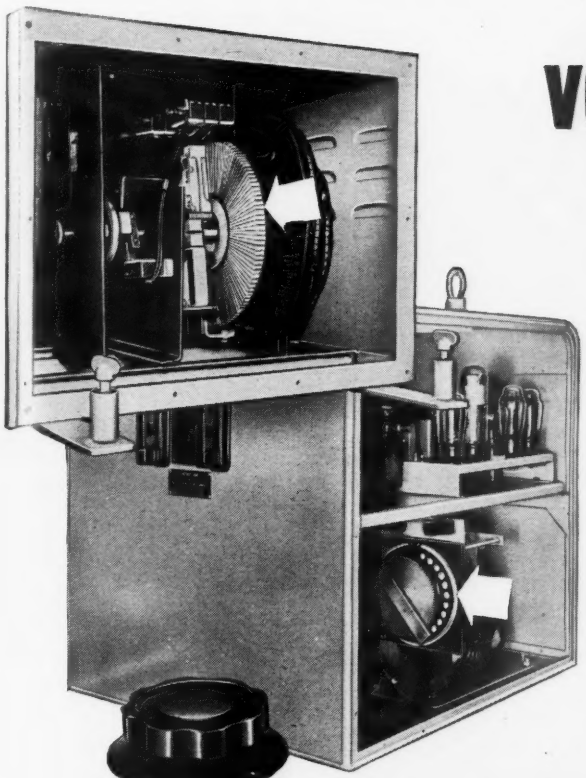

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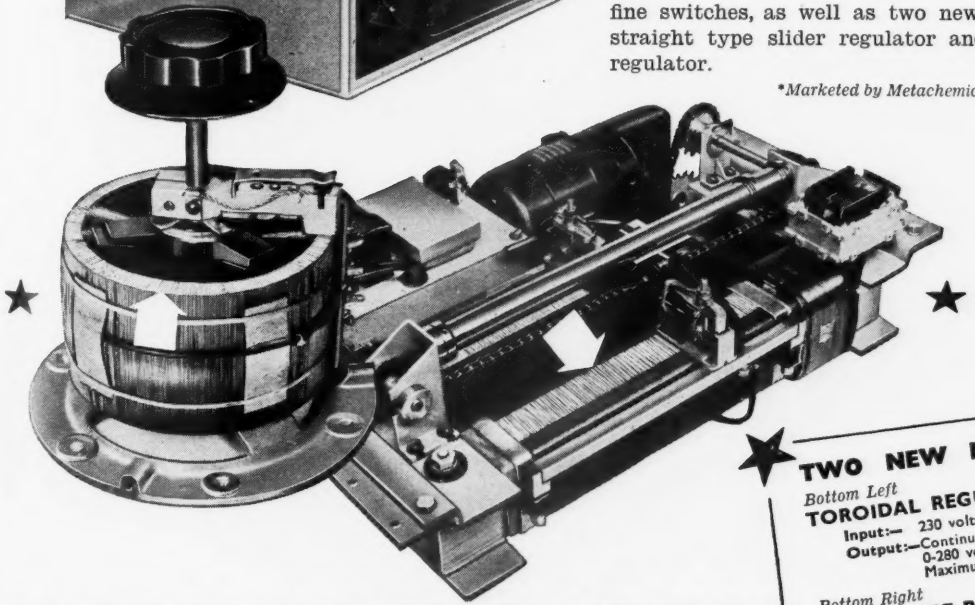
Foster Transformers Ltd., being specialists in tapped Transformer Regulators, introduces a new contact surface finish to their products.

The track over which the carbon brush operates is plated by the Dalic Process* with a non-oxidising, non-corrosive metal, thus giving a permanent low resistance contact surface.

This enables the rating of the Regulator to be slightly increased, and, more important still, lengthens the working life of the Regulator under adverse atmospheric conditions.

The process is being applied (as indicated by arrows) to our commutators and coarse and fine switches, as well as two new products, a straight type slider regulator and a toroidal regulator.

**Marketed by Metachemical Processes Ltd.*



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TOROIDAL REGULATOR
Input:— 230 volts.
Output:—Continuously variable from 0-280 volts no load. Maximum current 3 amps.

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SLIDER TYPE REGULATOR
Input:— Any nominal voltage between 200-250 volts ± 15%.
Output:—Equal to nominal input voltage ± 0.5% at 2.5 kVA.

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A 'LANCASHIRE DYNAMO HOLDINGS' COMPANY

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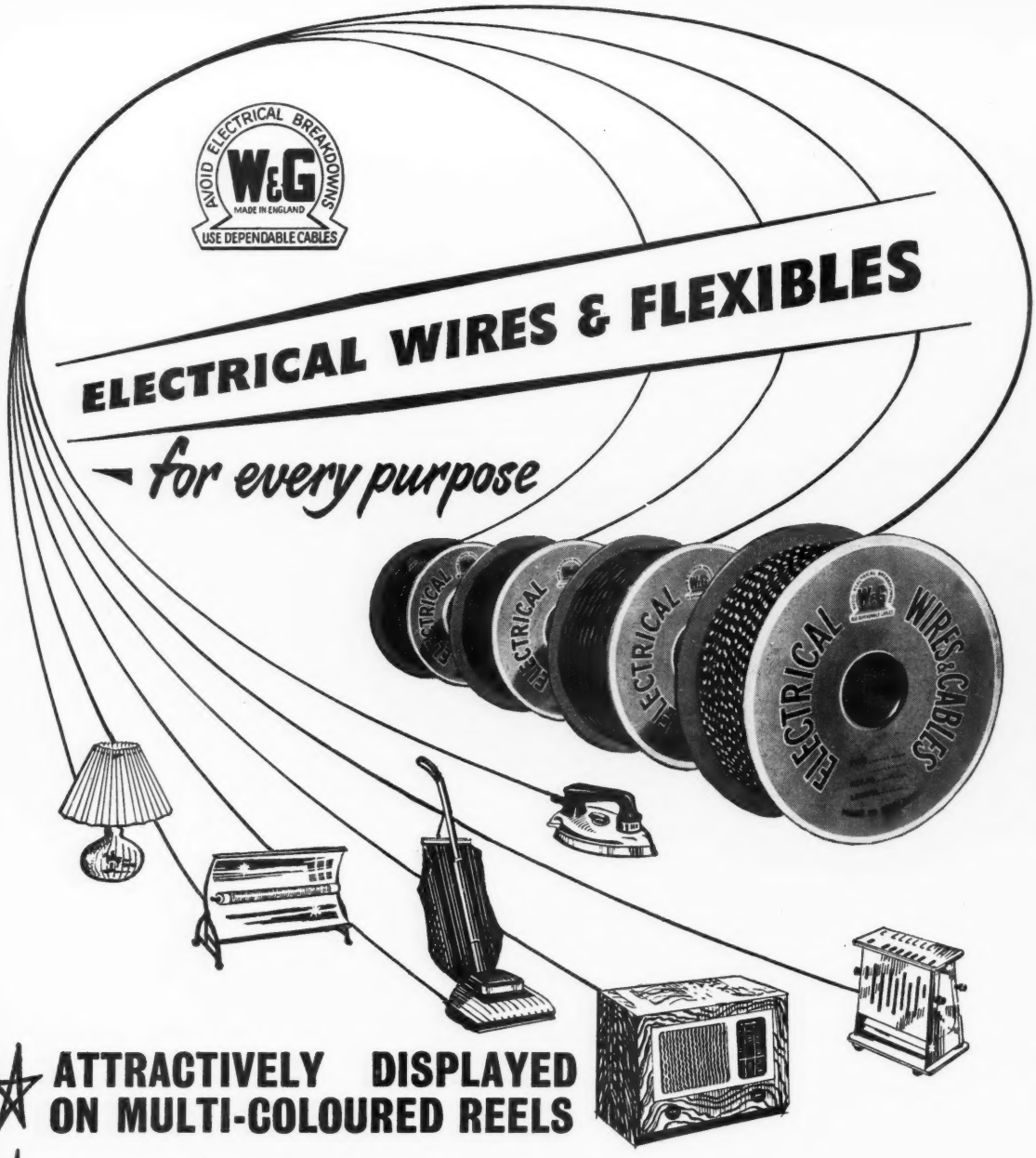

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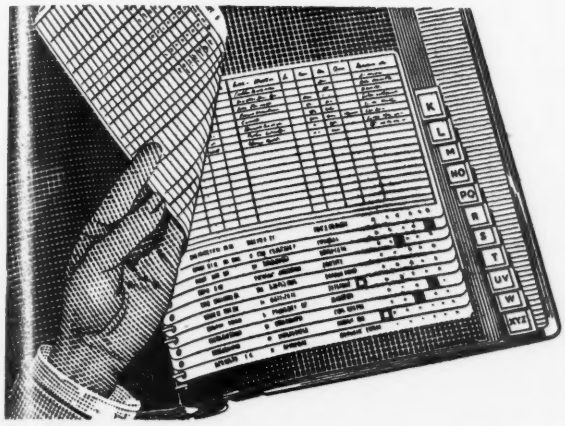
NEW METHOD for HIRE PURCHASE

Three Entries with One Writing
—Plus Special H.P. Record



You want to see the financial state of every Hire Purchase account at a glance . . . . A new visible record has just been designed for this purpose. On one small sheet just a few inches square there is every item of information you require—name, address, guarantor, agreement number, duration, price, payments, charges, balances . . . And colour-signals flash warnings of outstanding instalments, etc.

This means quick sighting, speedy entry, *visual* control of every one of a hundred or ten thousand accounts. But, in addition, a simple device cuts down even this reduced clerical labour by 66⅔ per cent.. . . . so that customer's ledger account journal and receipt slip *can all be entered WITH ONE WRITING!*

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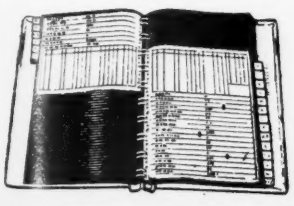
Just jot "H.P. Records" on your letter heading and full details will be sent you by return.



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VISIBLY BETTER RECORDS

The Shannon Ltd.
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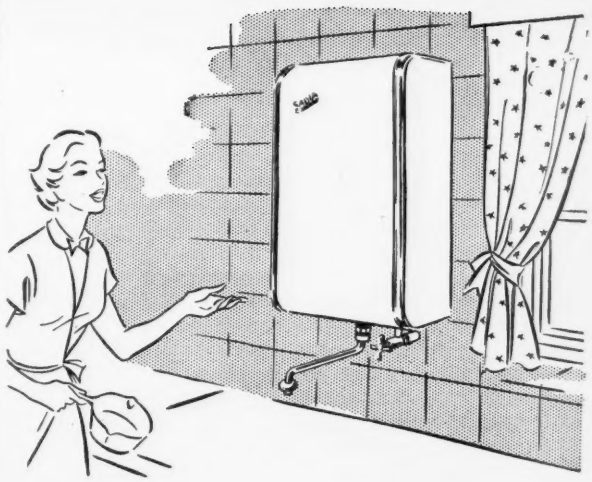

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The Sadia 'Select' is the latest product of the only specialists in electric water heating. 30 years of experience in this field are built into the Sadia Range of Electric Water Heaters, both large and small.

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Hot Water by Electricity

AIDAS ELECTRIC LTD., SADIA WORKS, ROWDELL ROAD, NORTHOLT, GREENFORD, MIDDX.
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Agents for Scotland:—W. Brown & Co. (Engineers) Ltd., 89 Douglas Street, Glasgow, C.2.
Manufactured in S. Africa by:—Sadia Water Heaters (Pty) Ltd., 3-5 Newton Street, Village Main, Johannesburg.

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We build our future

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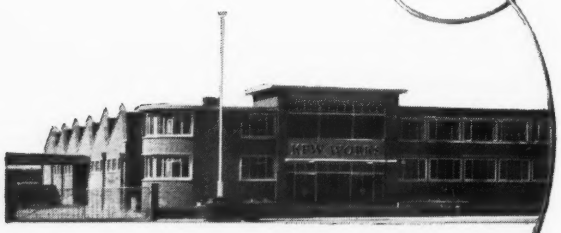
Output will be increased, but our growth will not bring impersonality... we will retain the characteristics of the personally conducted business... on that we built our past... so will we build our future,



Kent Bros. Electric Wire Co.

& E.H. Phillips Limited

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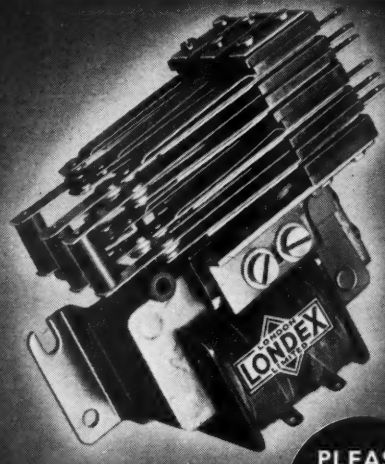

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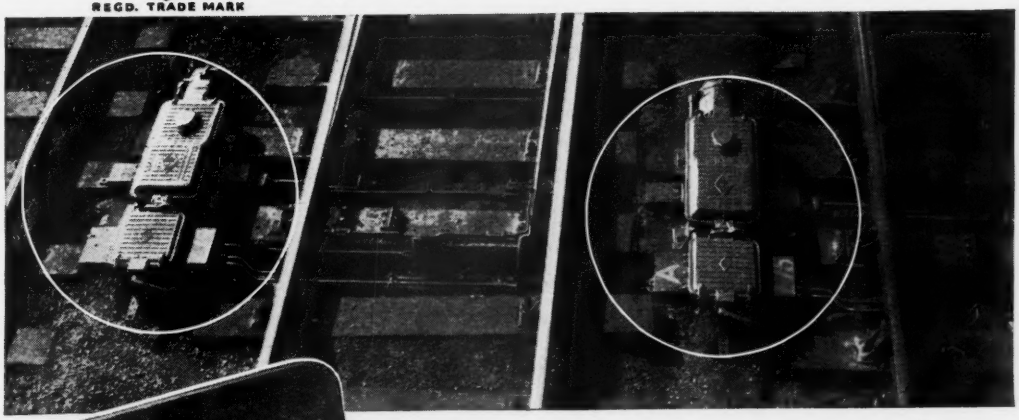

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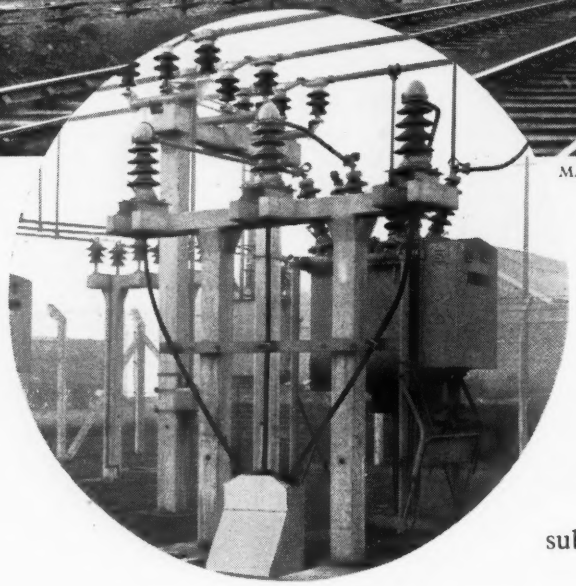

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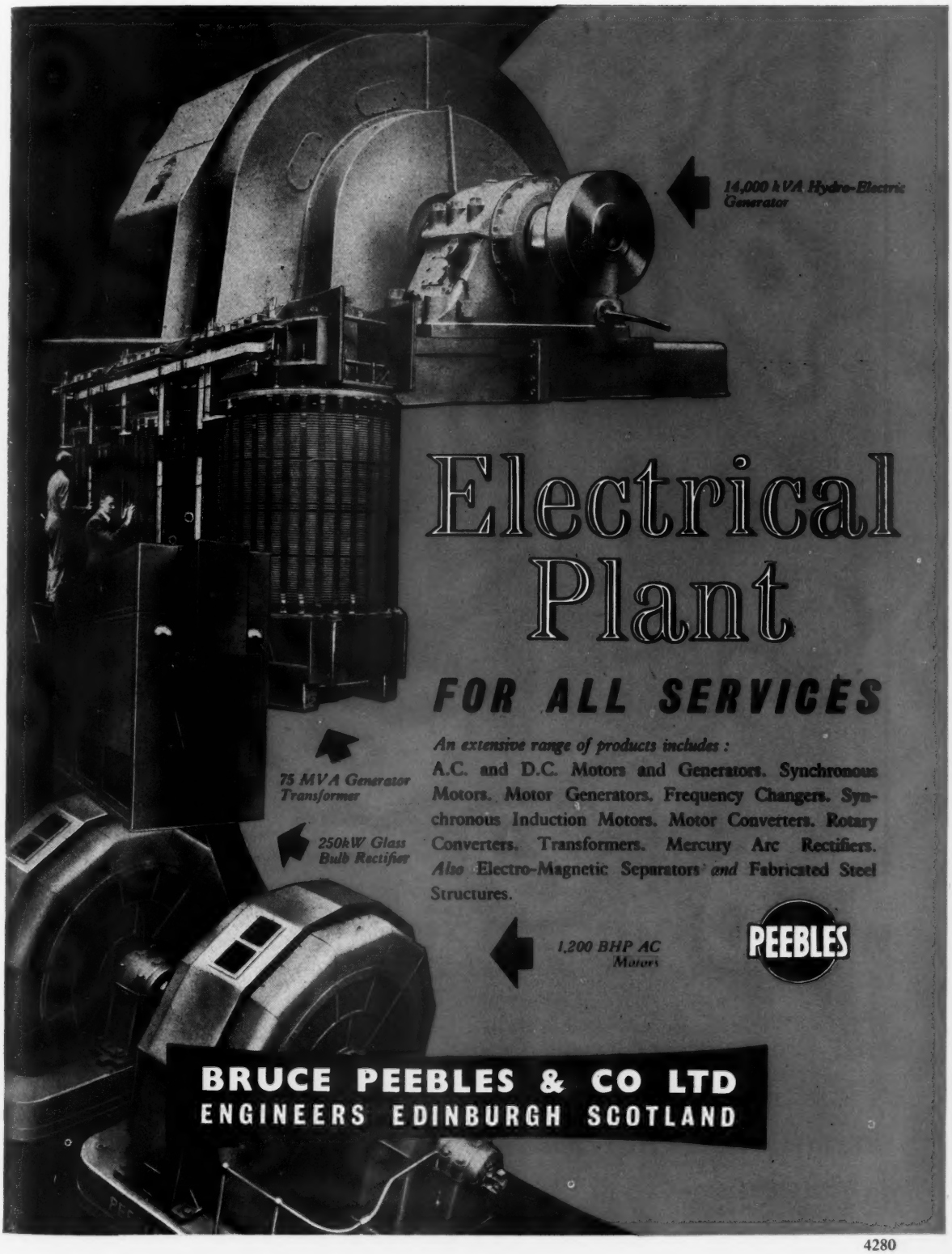
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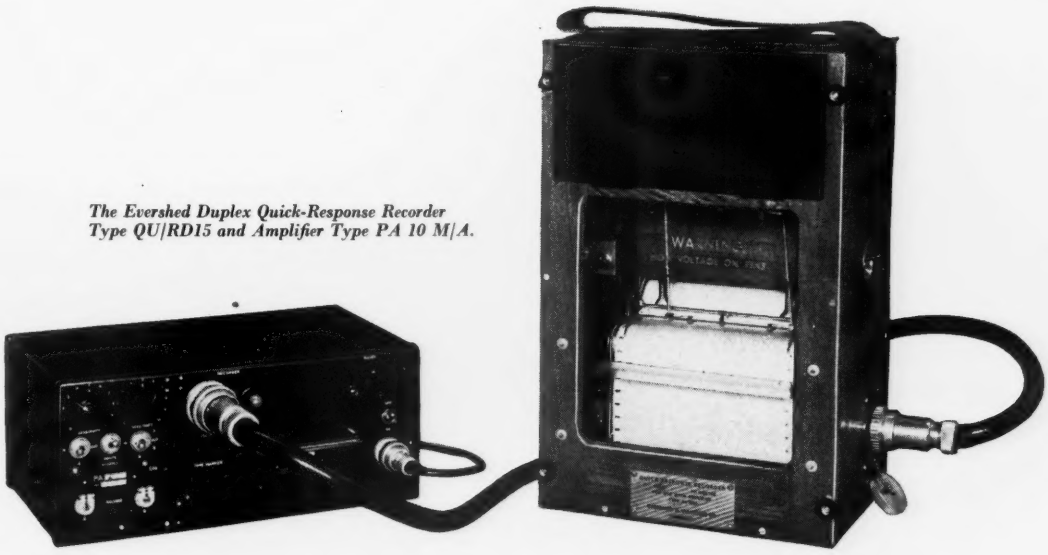

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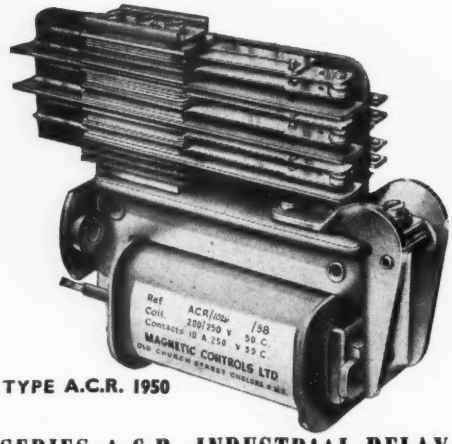

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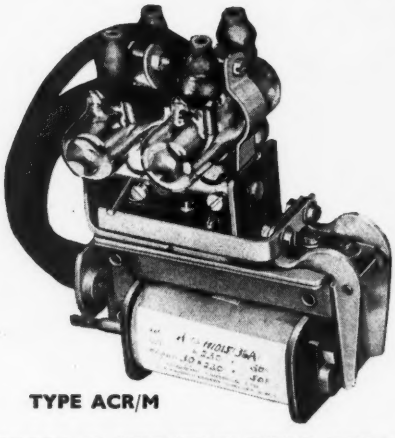

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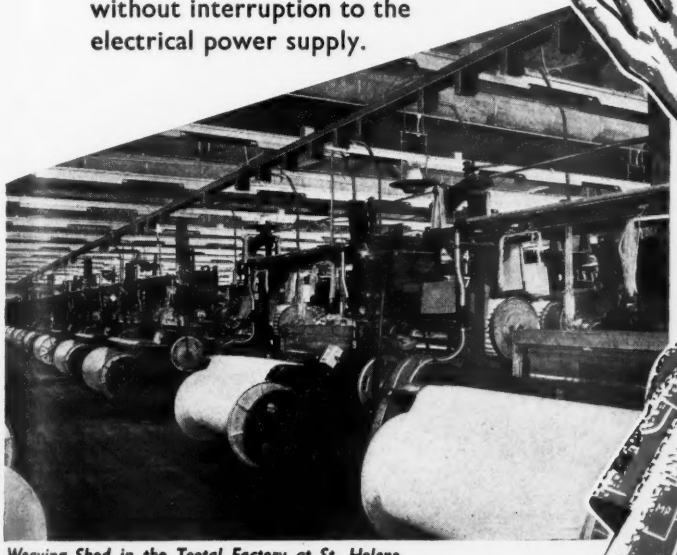

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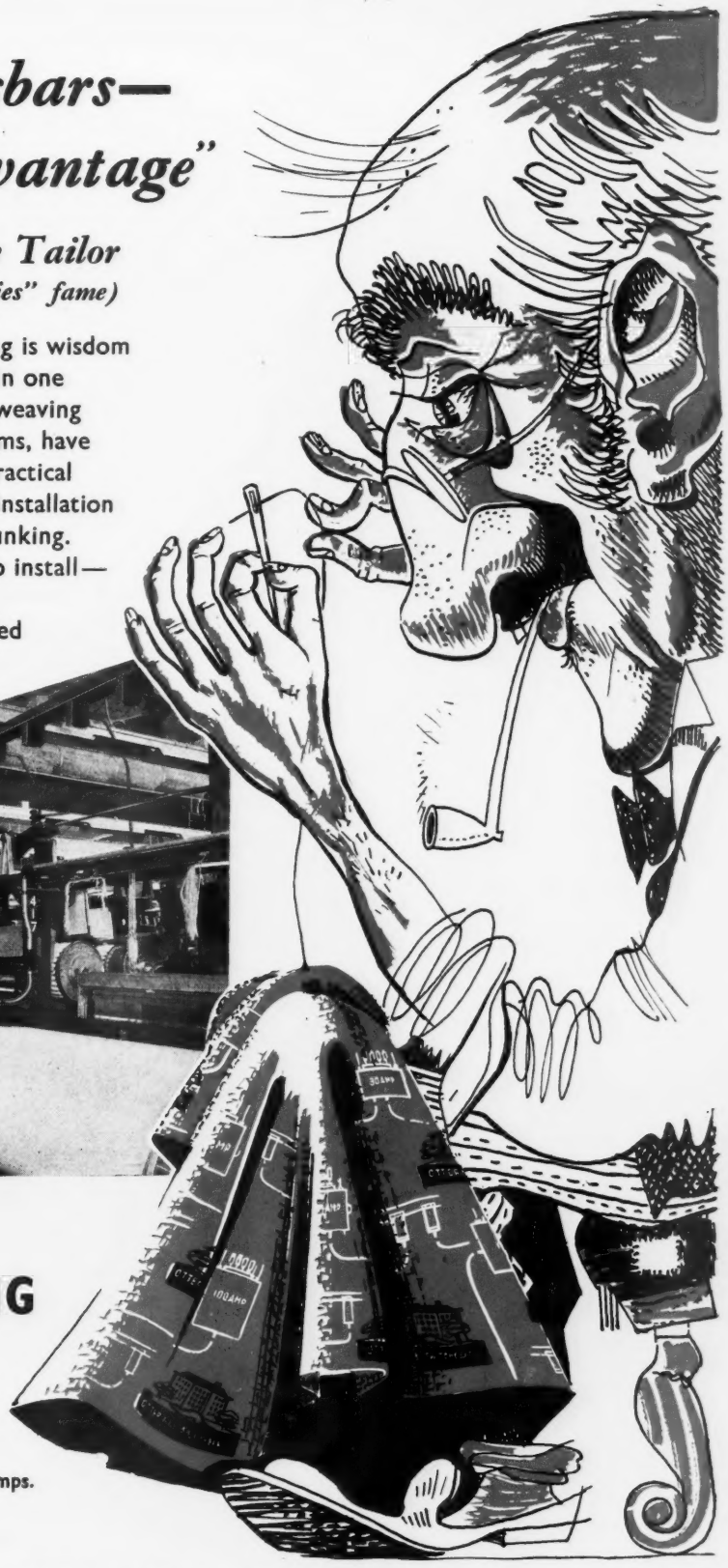

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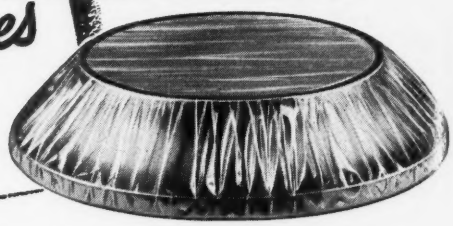

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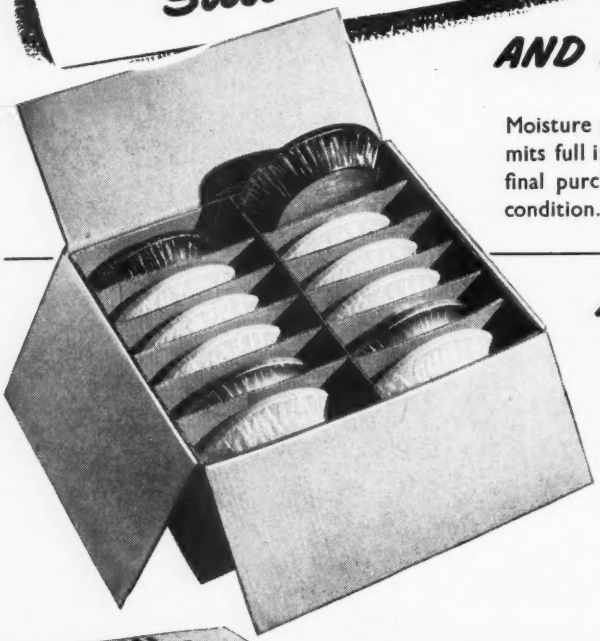

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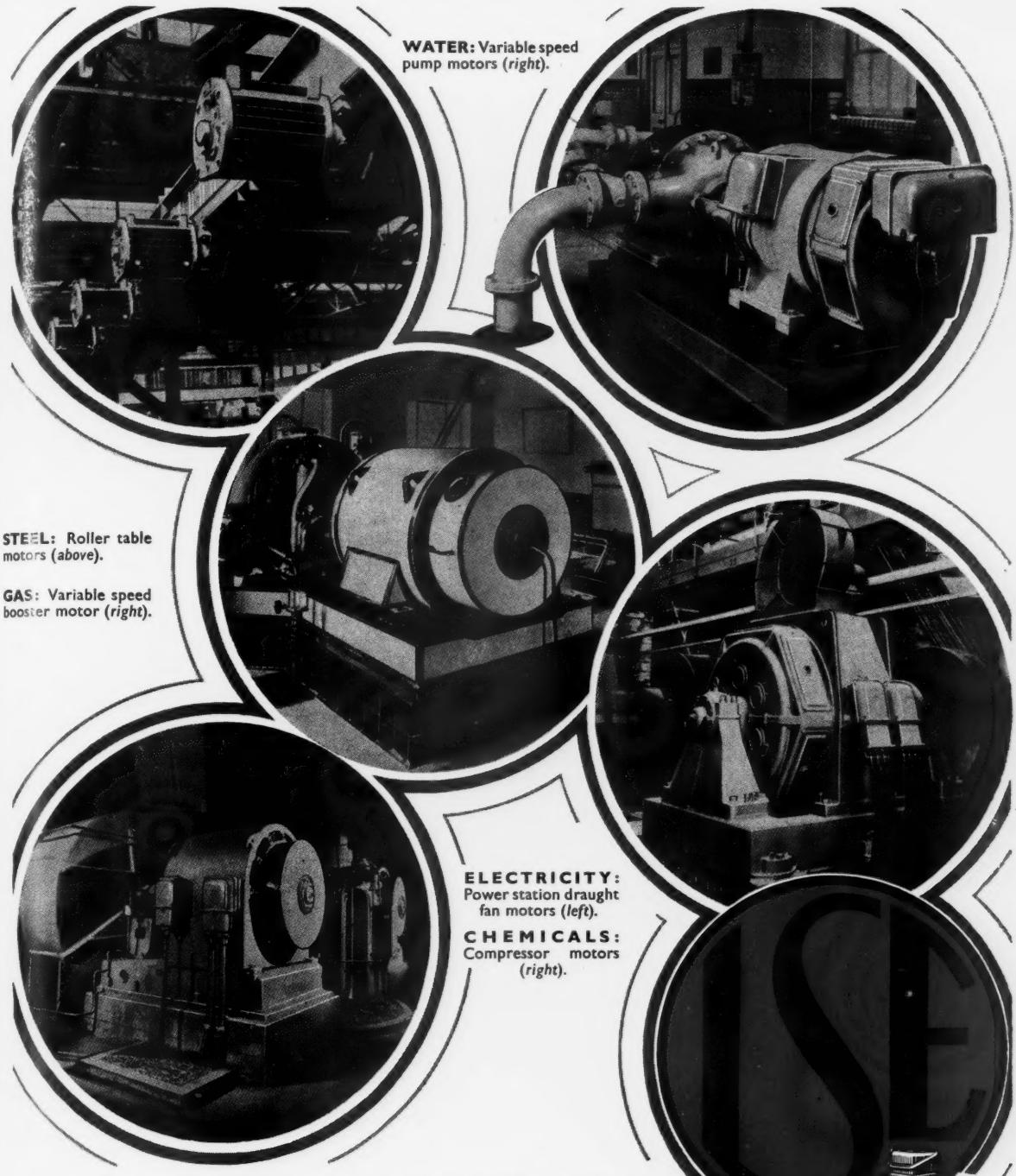

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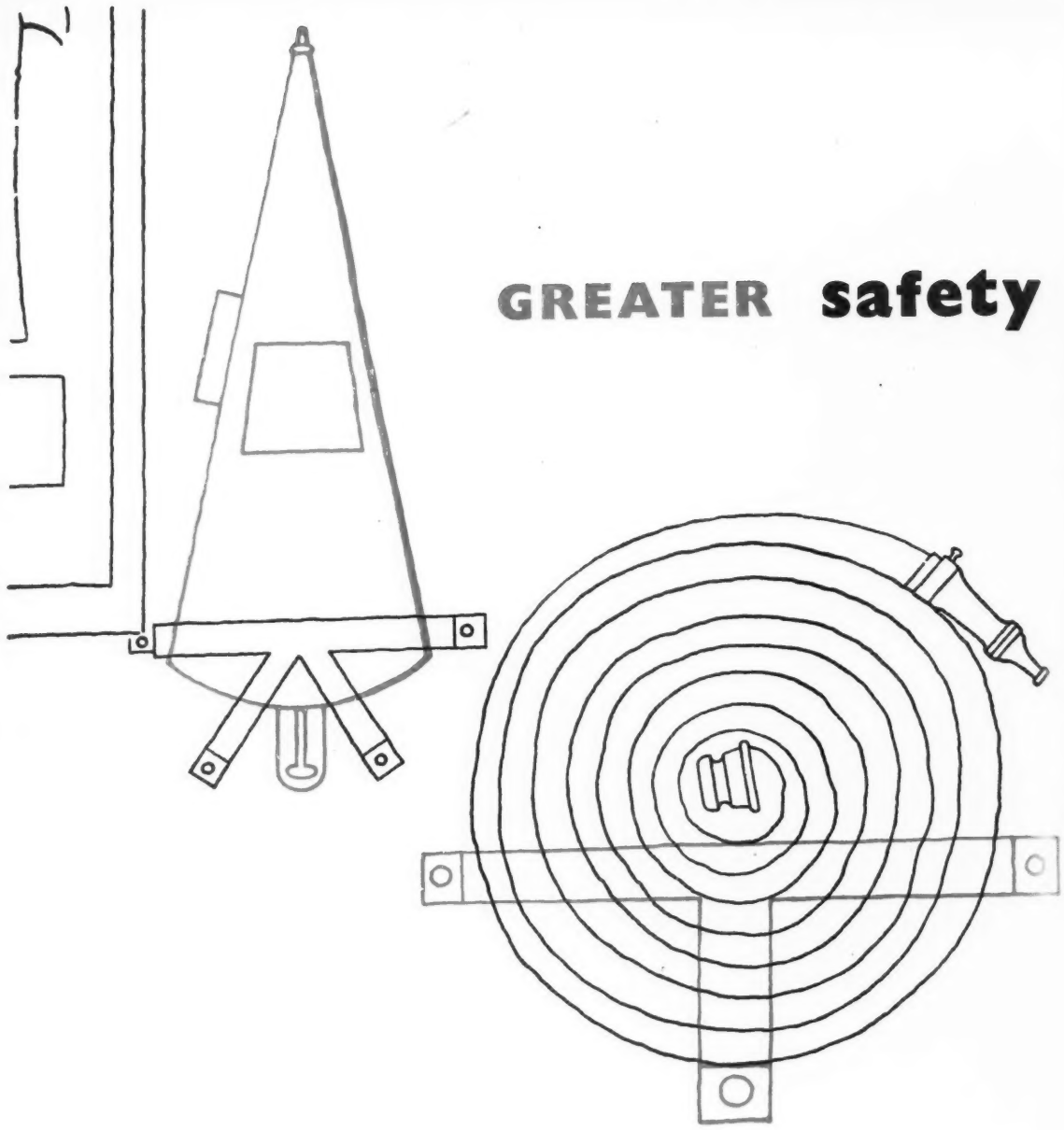

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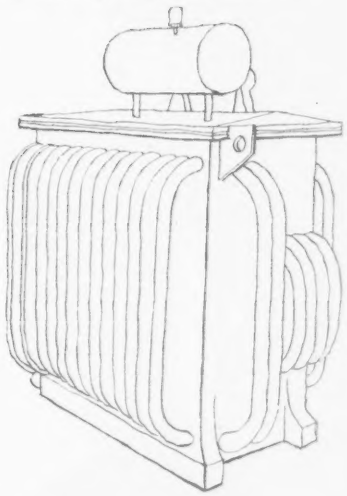

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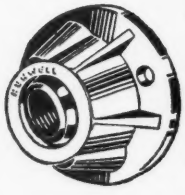

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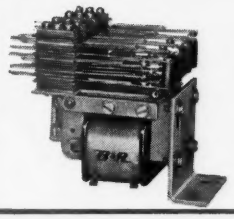
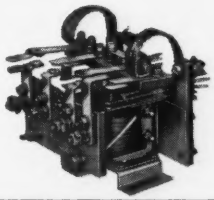


TYPE C.01
The large brother of the J.01. Even more sensitive and with higher contact ratings.



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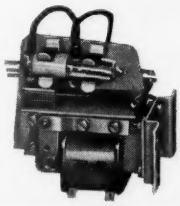

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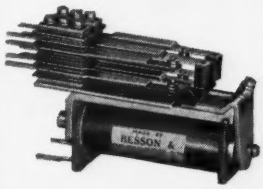

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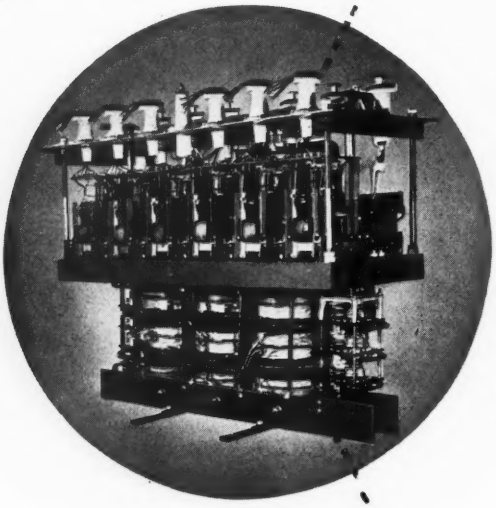

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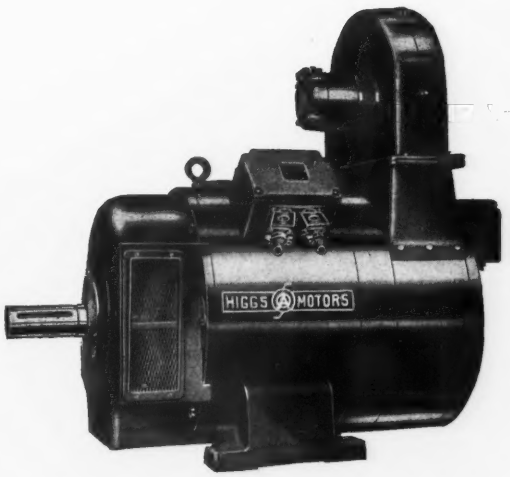

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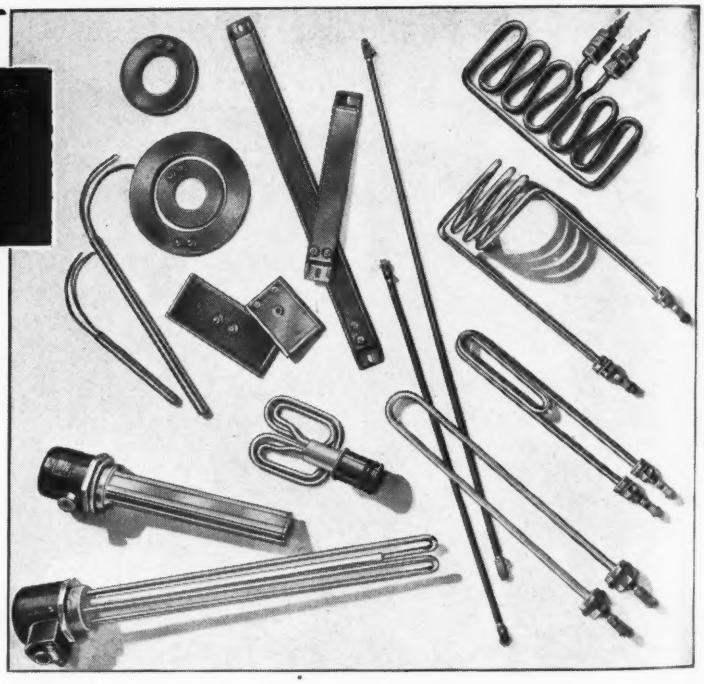

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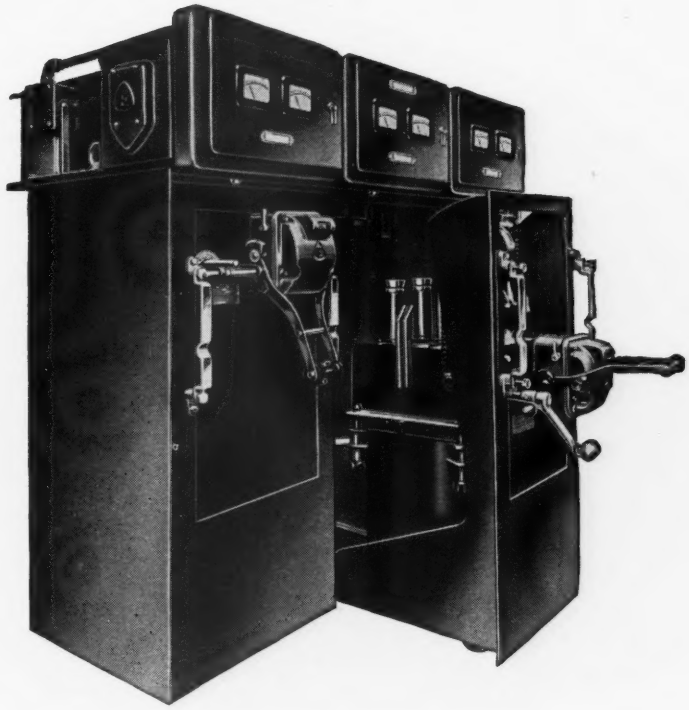

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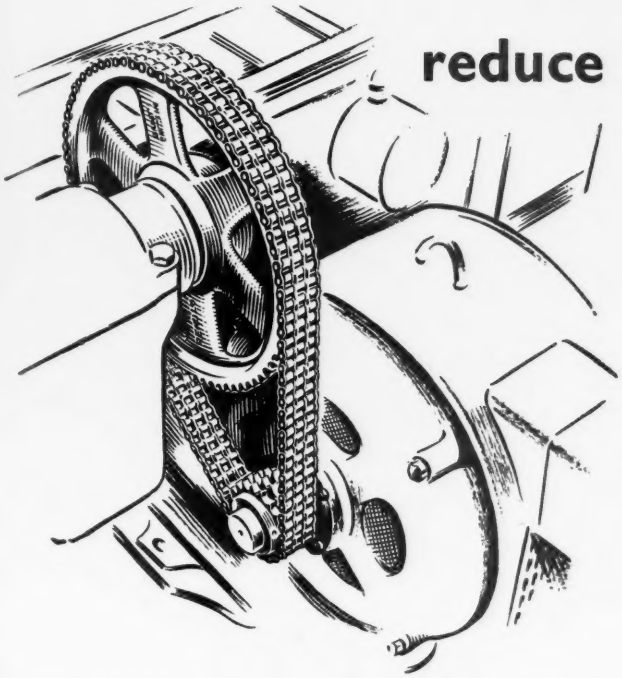

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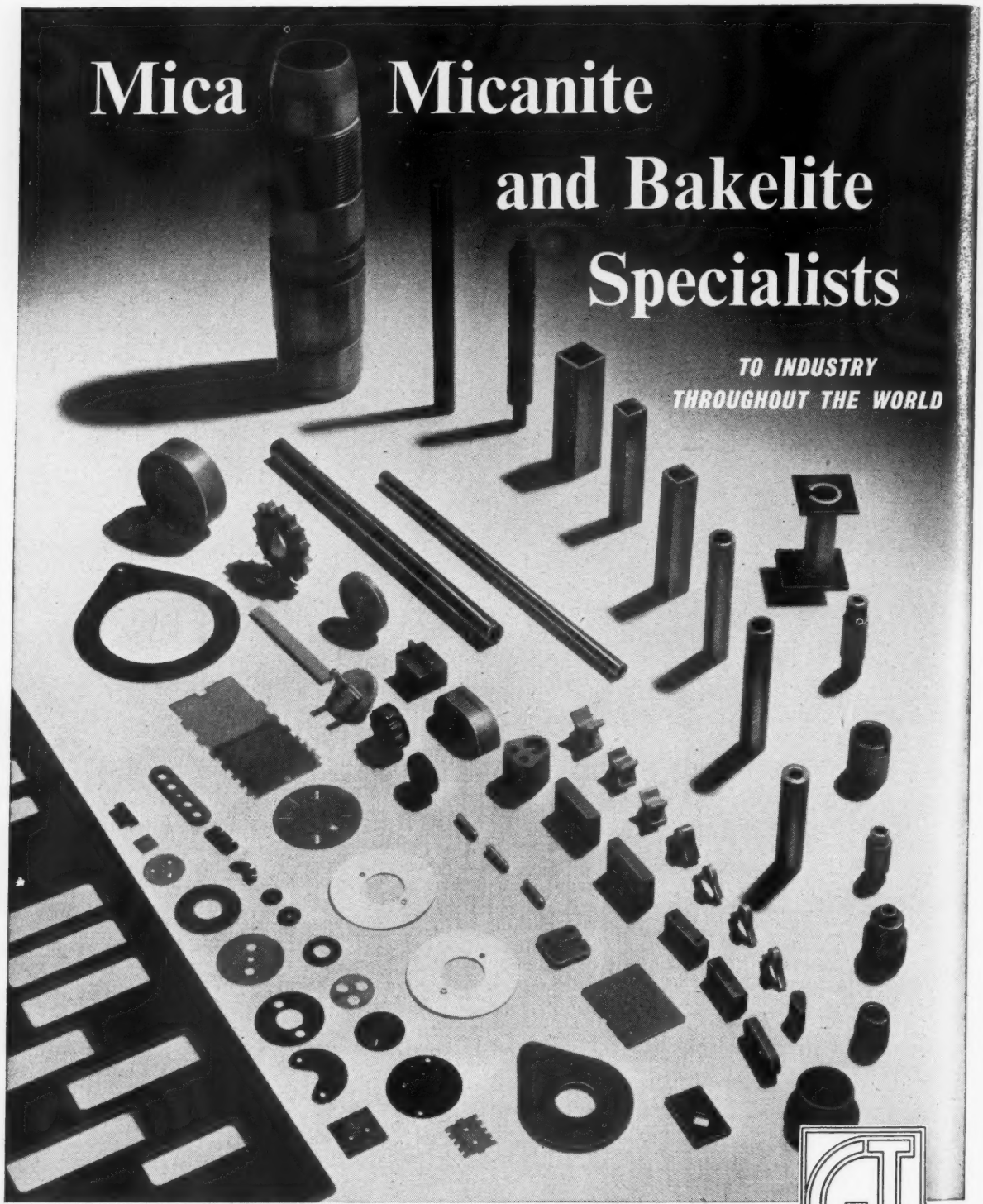

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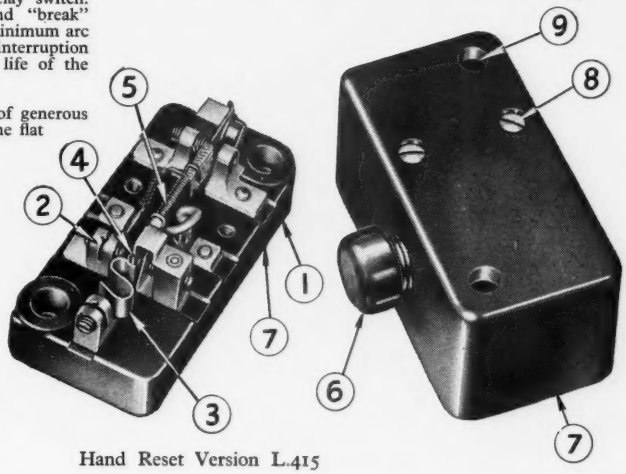

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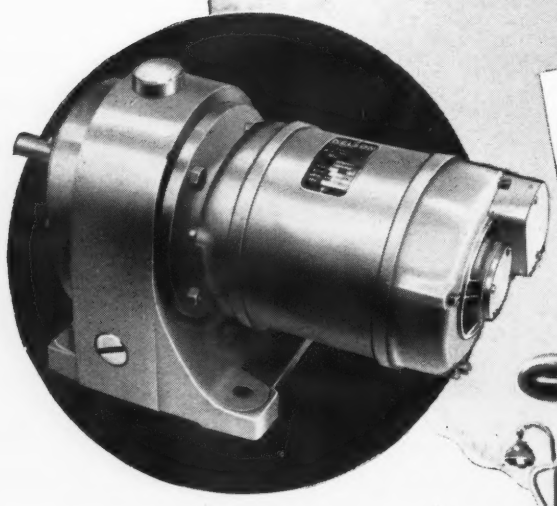

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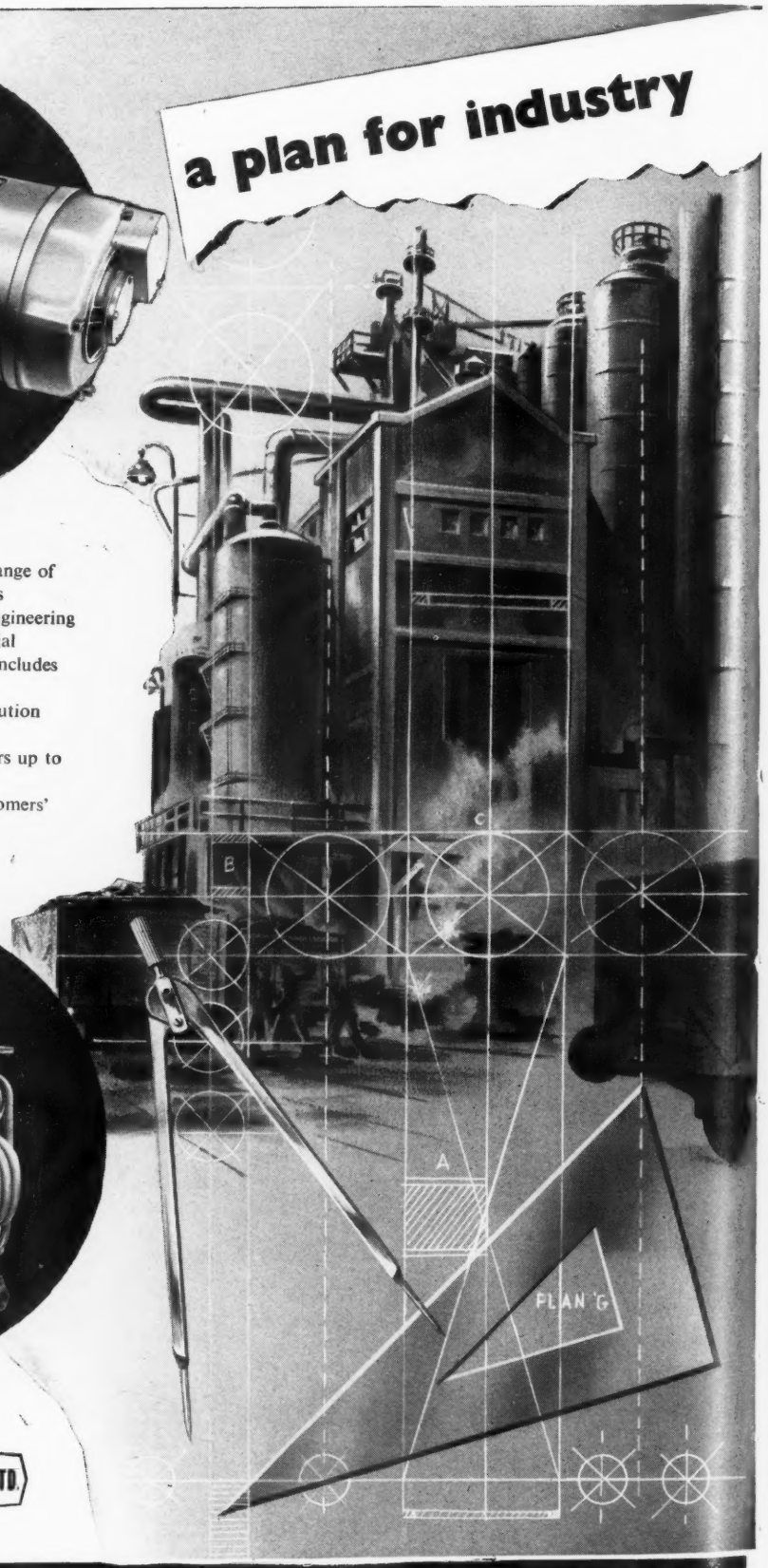

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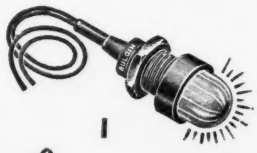
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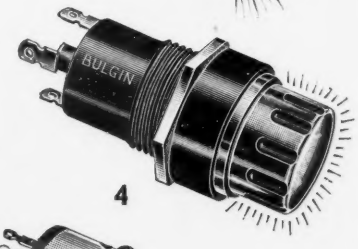

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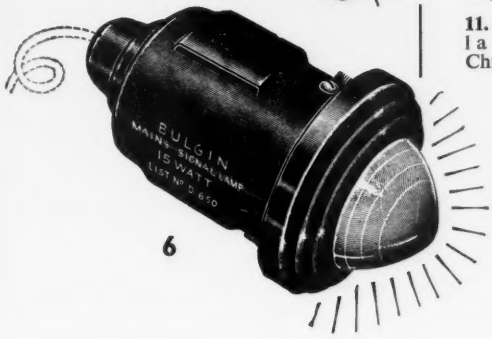

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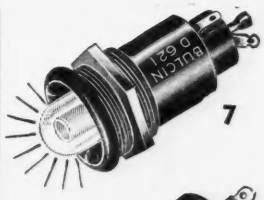

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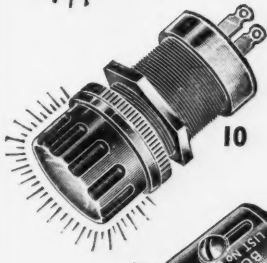
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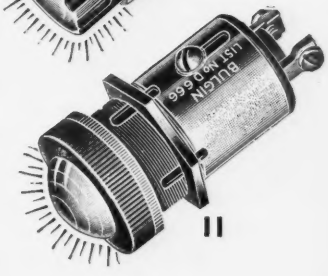

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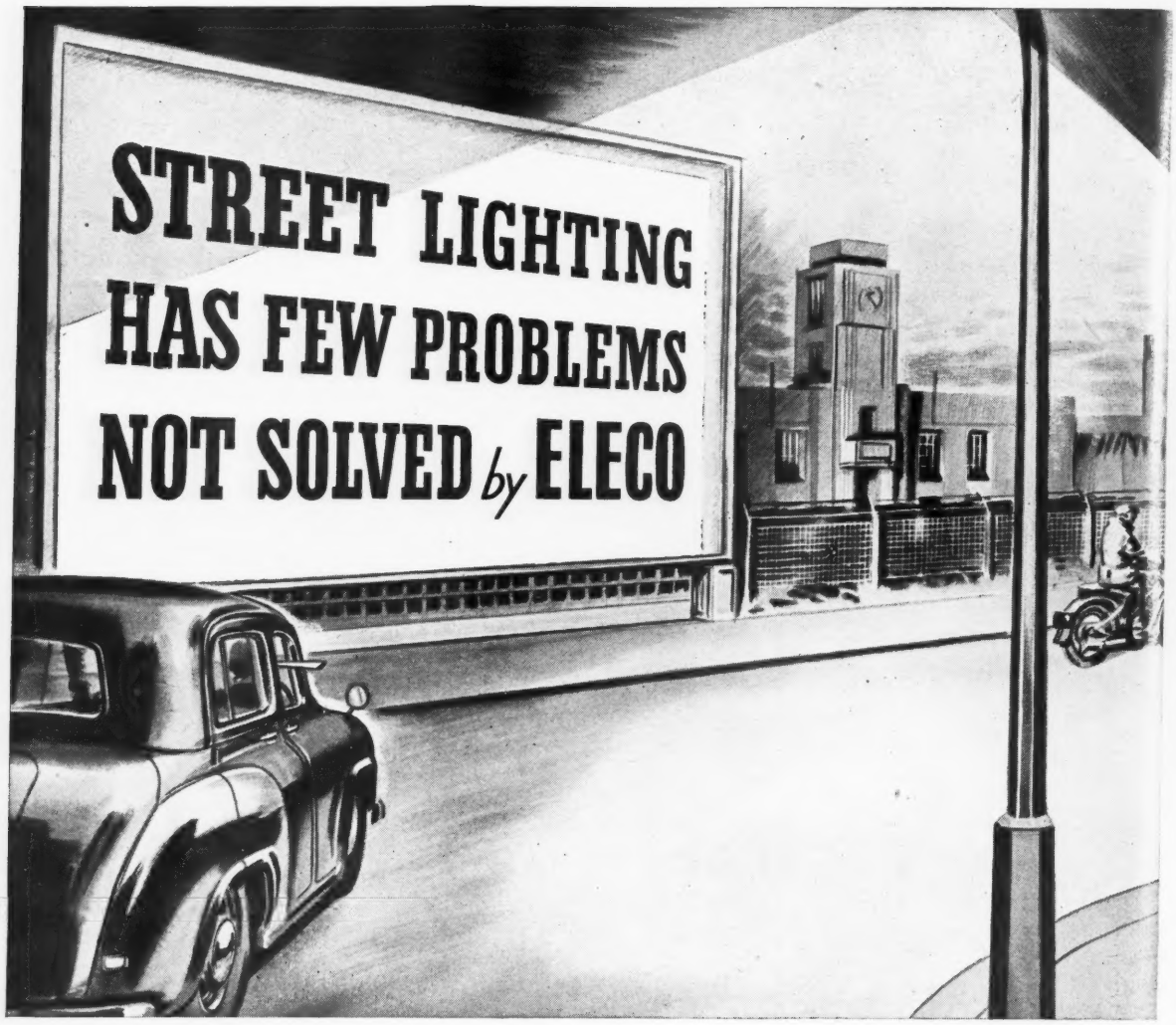

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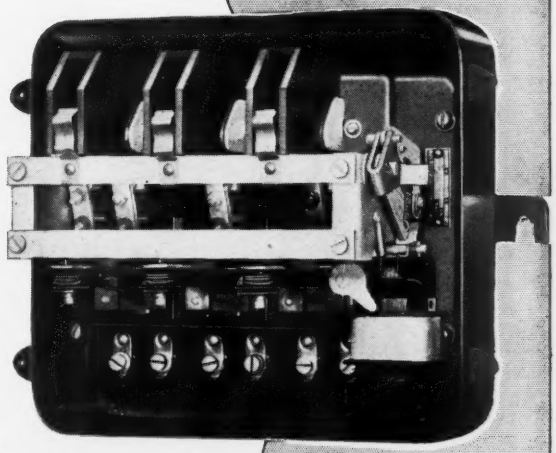

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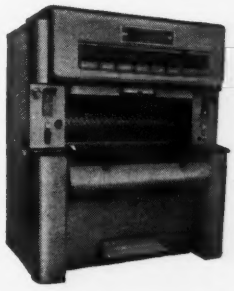

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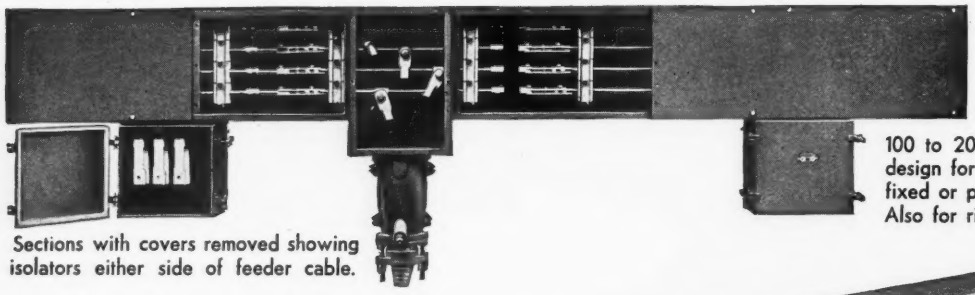

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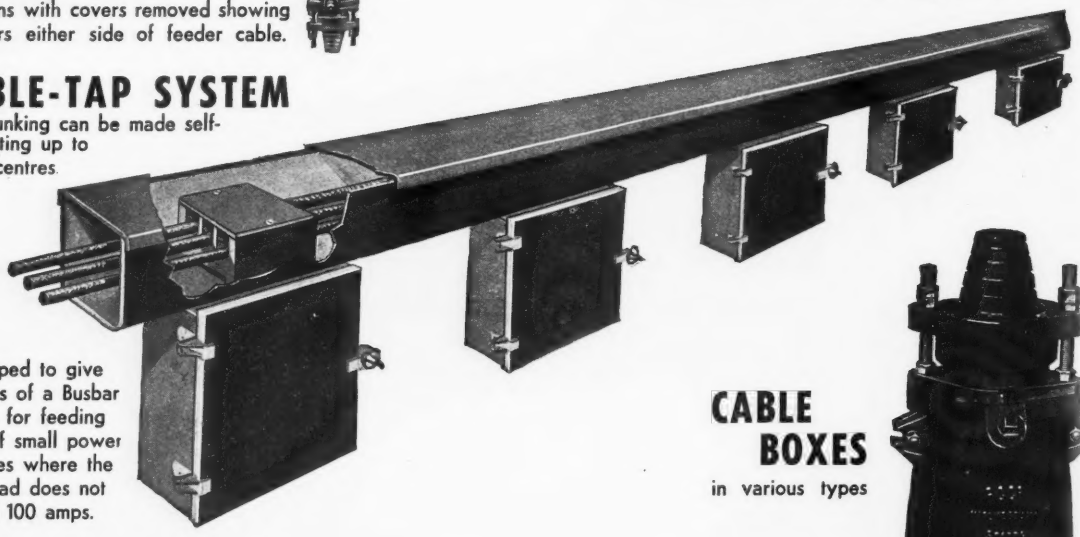

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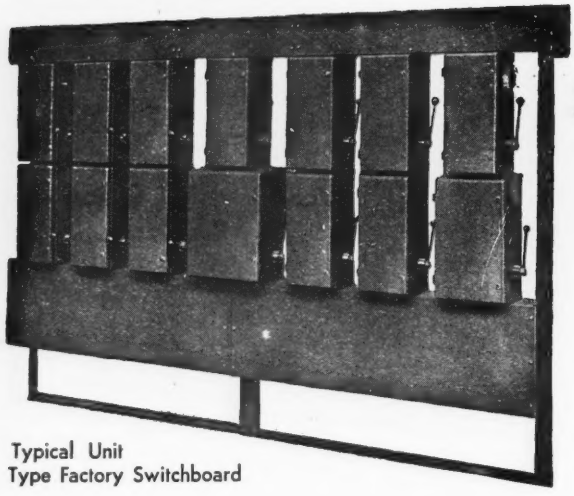

Typical Unit
Type Factory Switchboard

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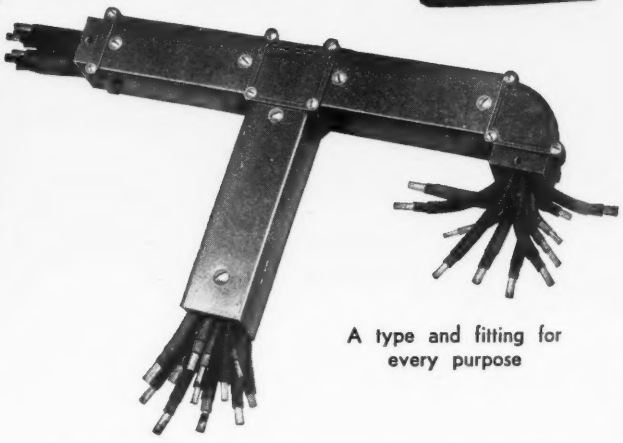

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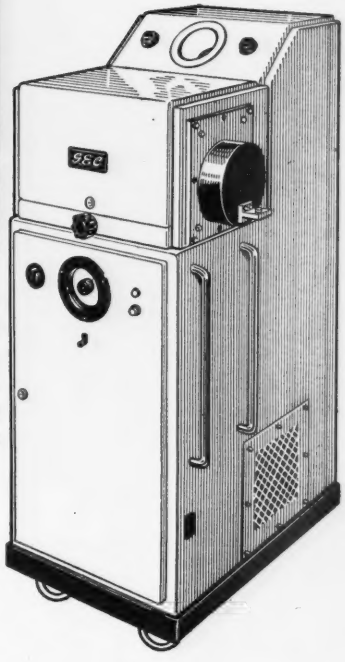

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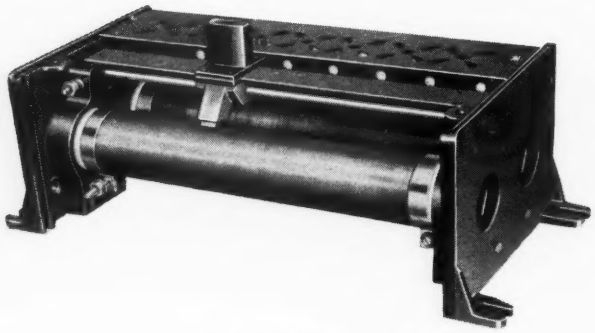

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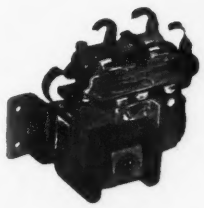

AS COMPONENT PARTS OR COMPOSITE EQUIPMENT

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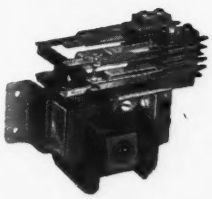

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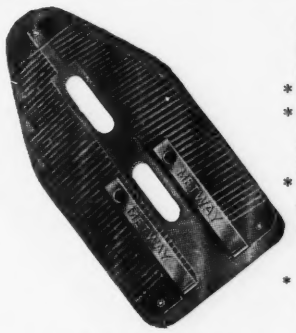

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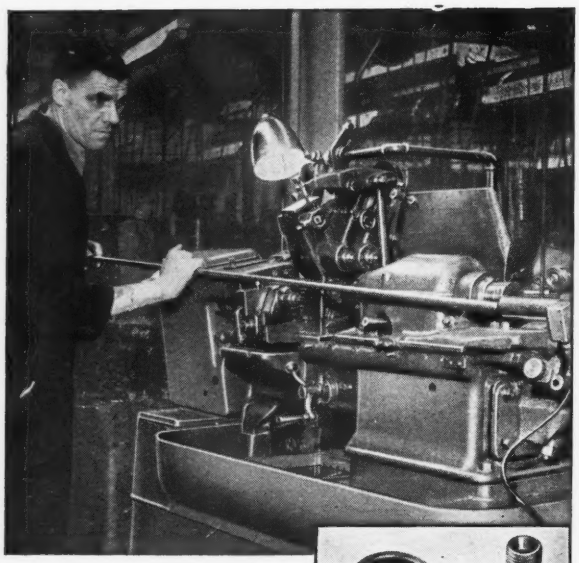

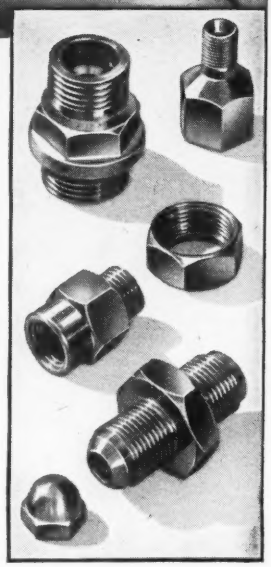

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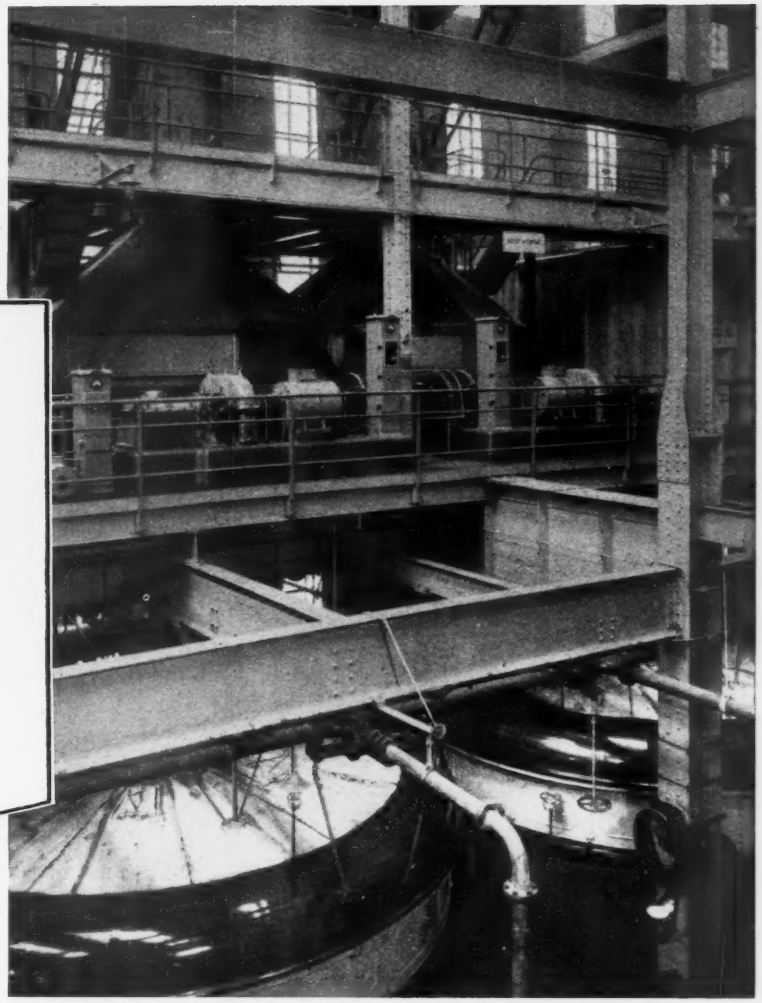

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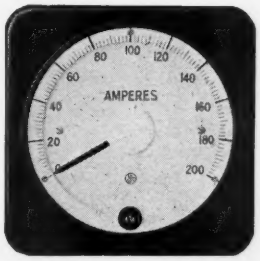
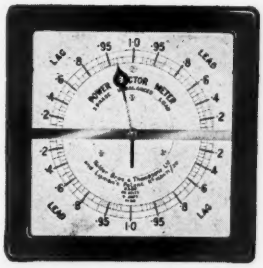
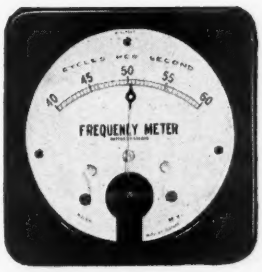


N.C.S. Platform Scale Ammeter
Type SQB



N.C.S. Power Factor Indicator
Type SQS



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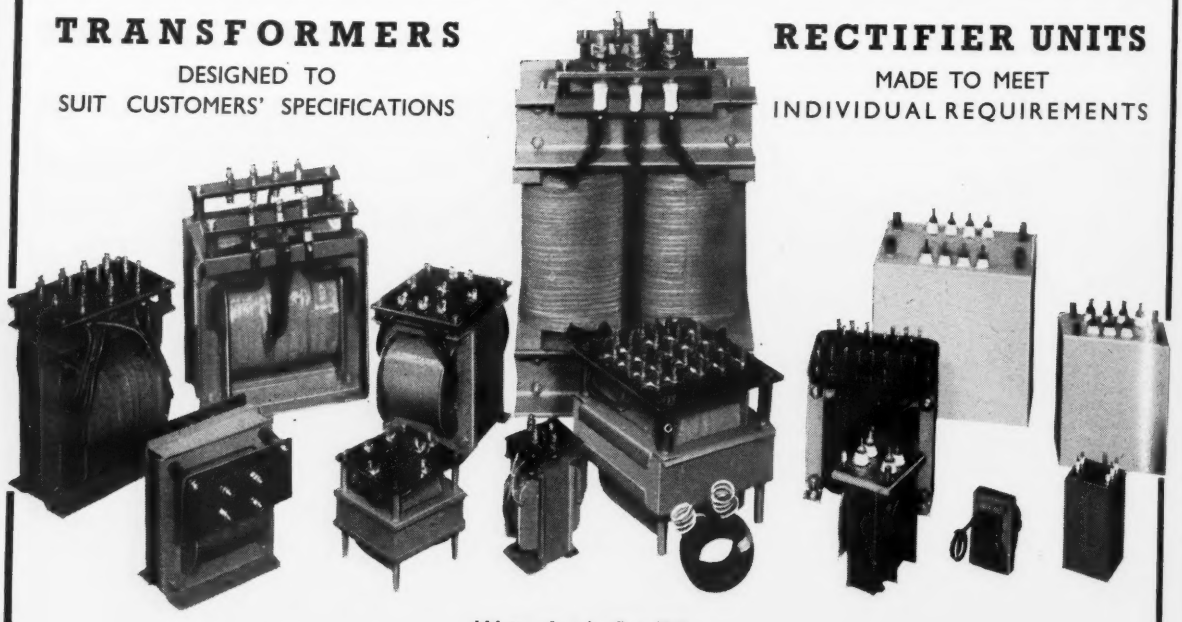

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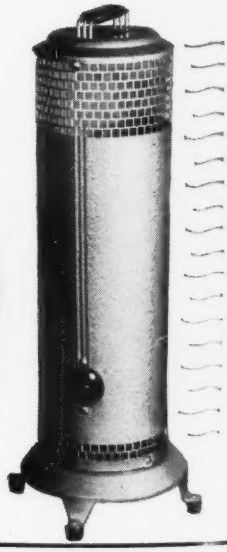

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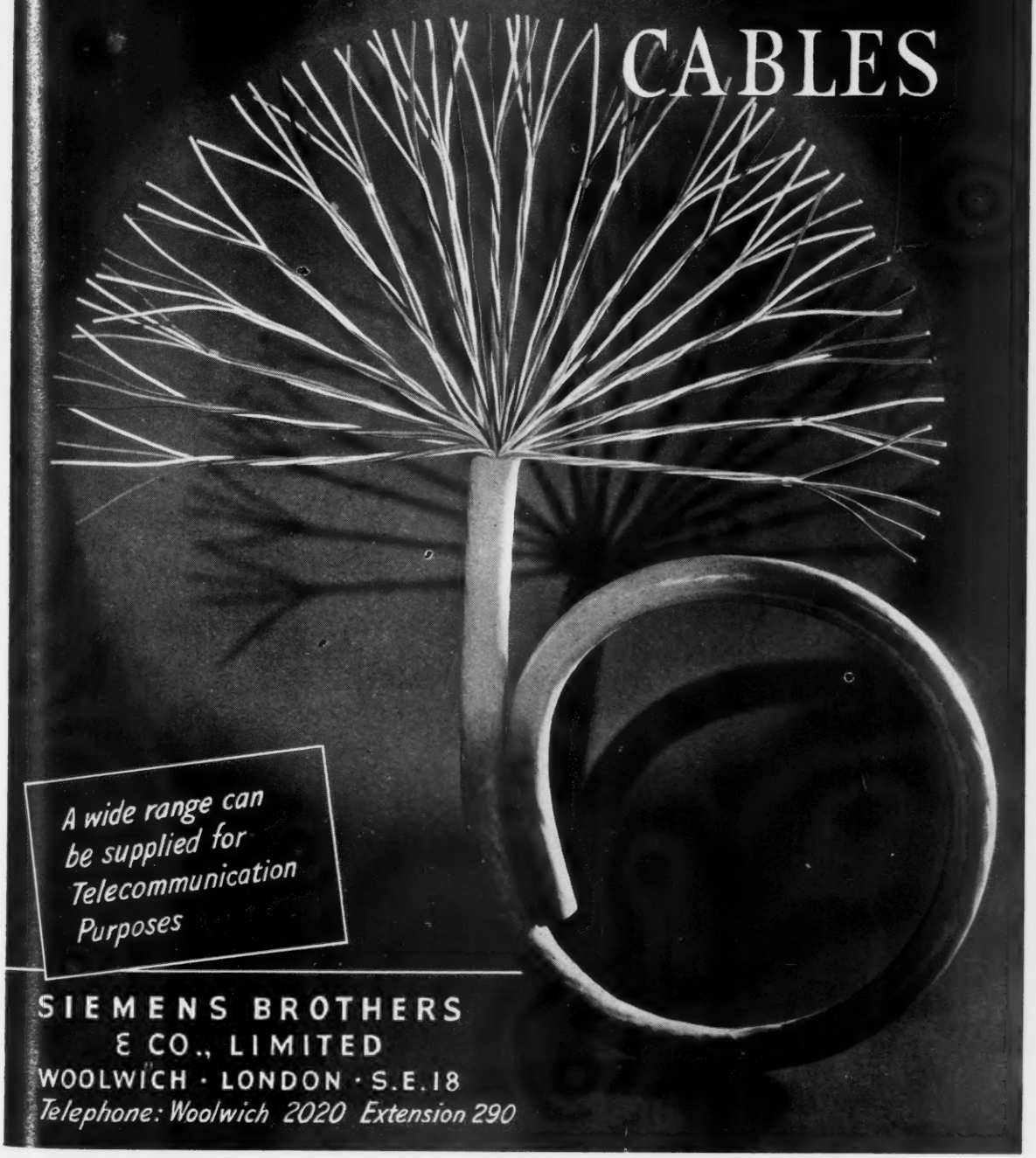

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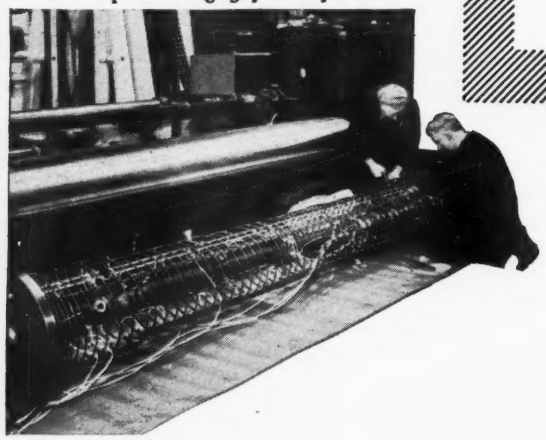

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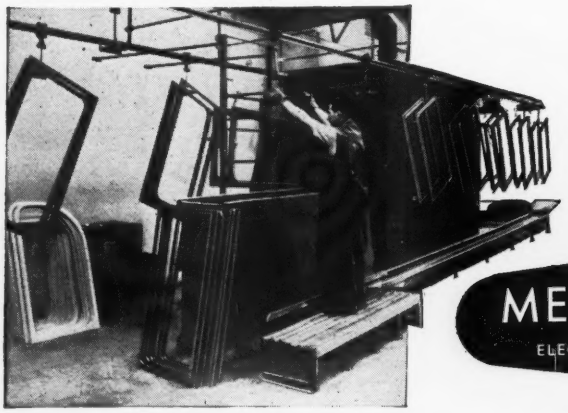

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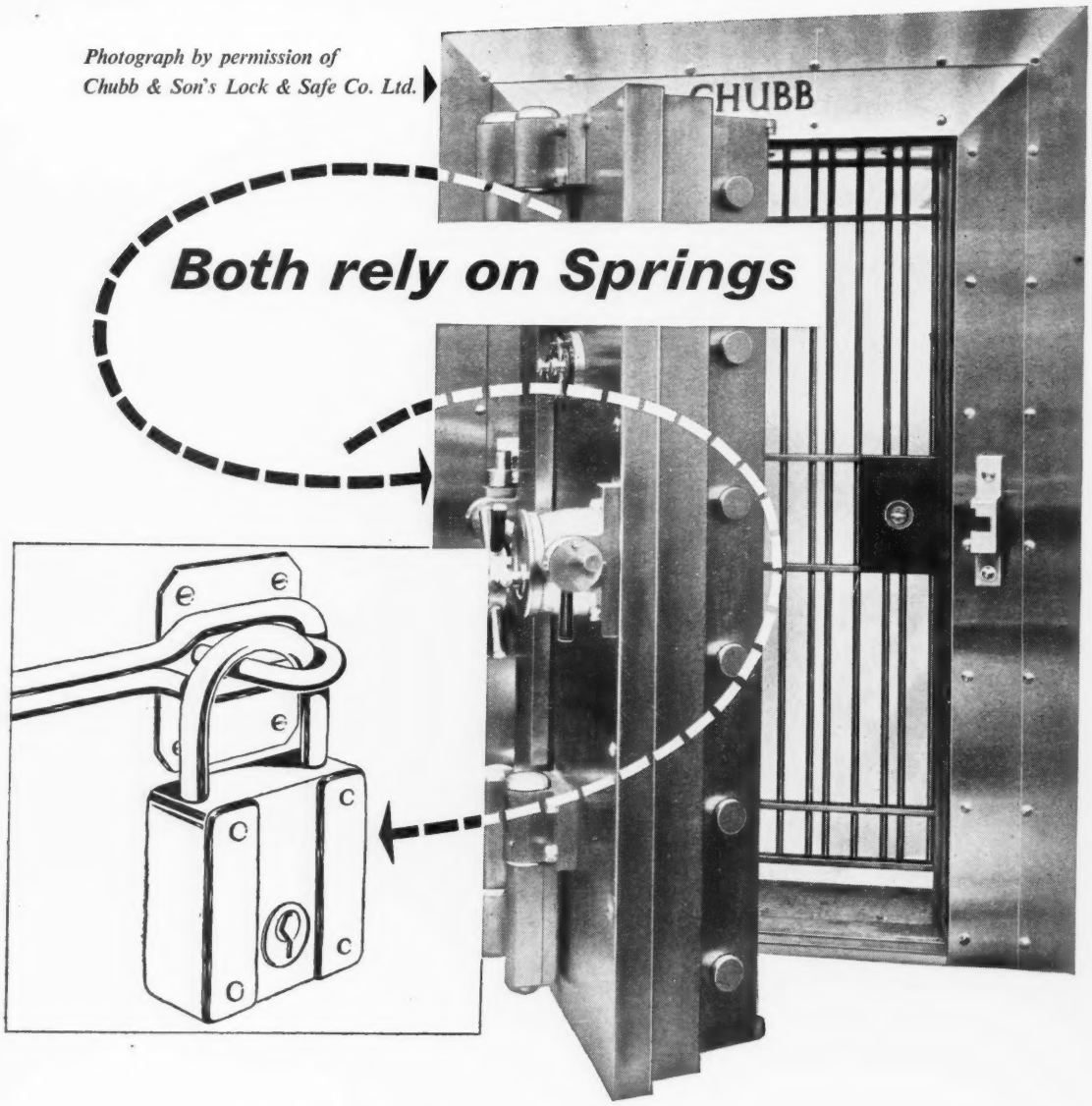

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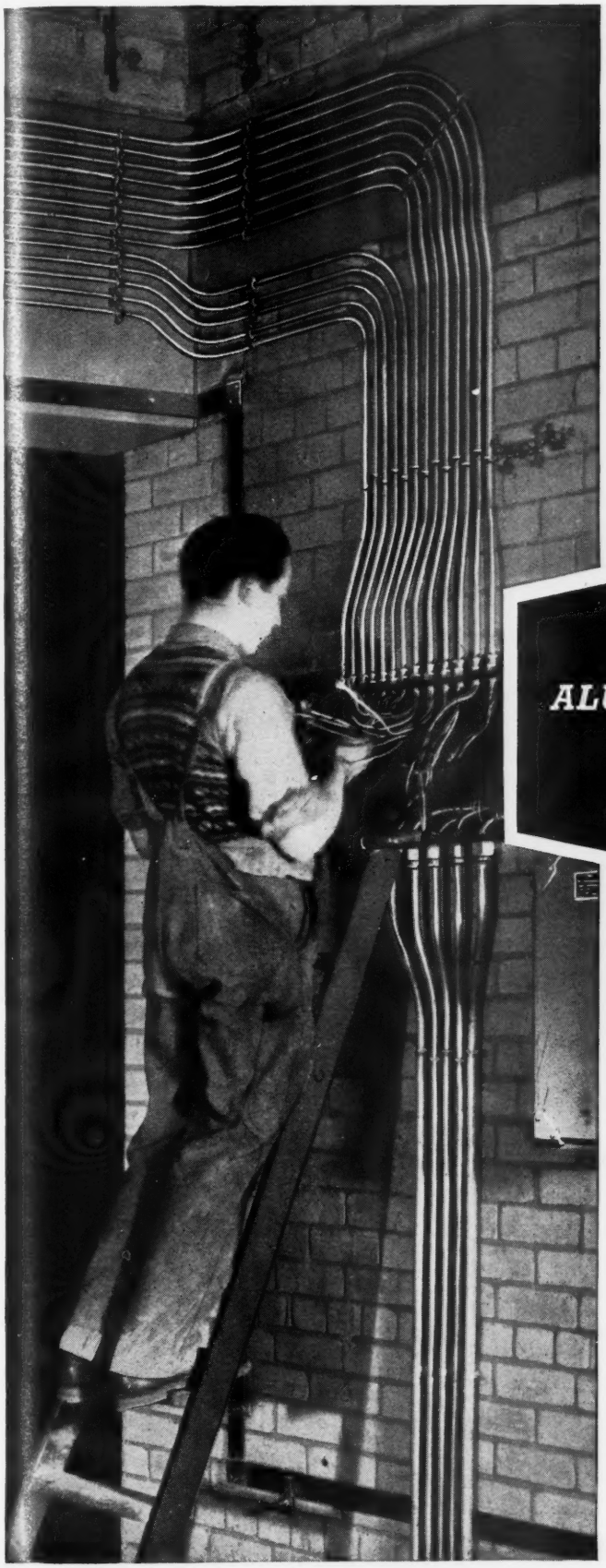

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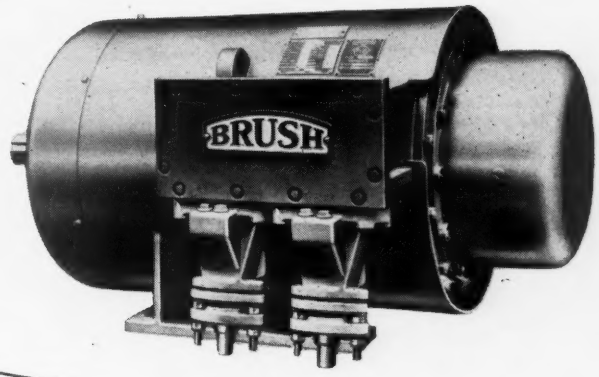

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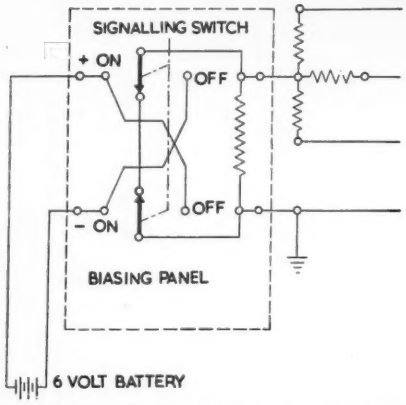

This diagram shows how simple it is. The only additional equipment needed is a single robust relay on each lamp standard.

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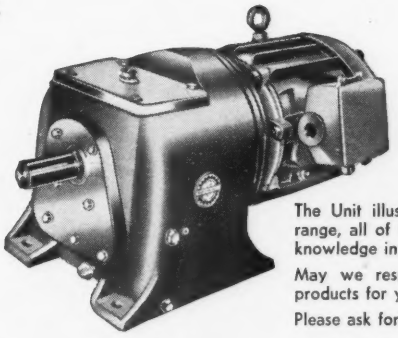

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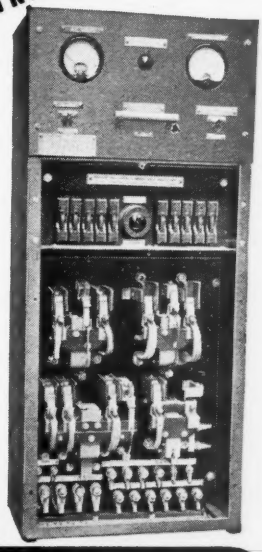

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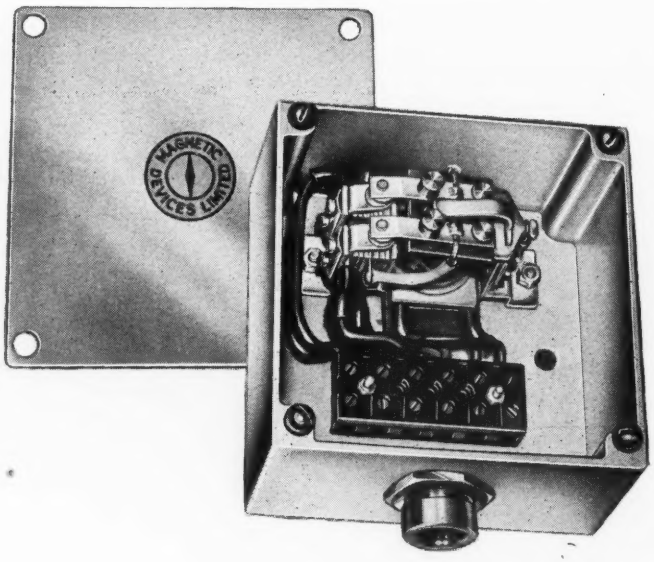

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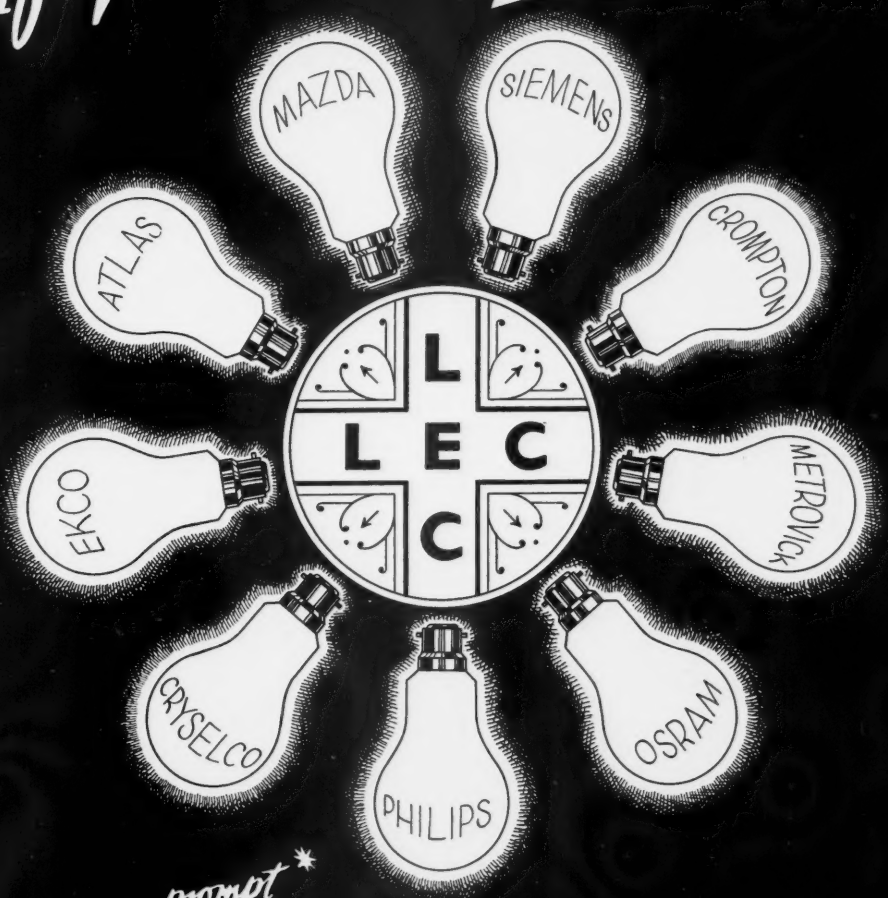

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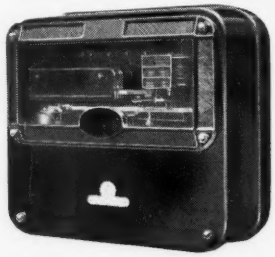

Type AMJ/P/2, double element, rolling ramp pattern, projecting mounting

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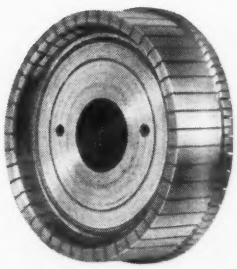

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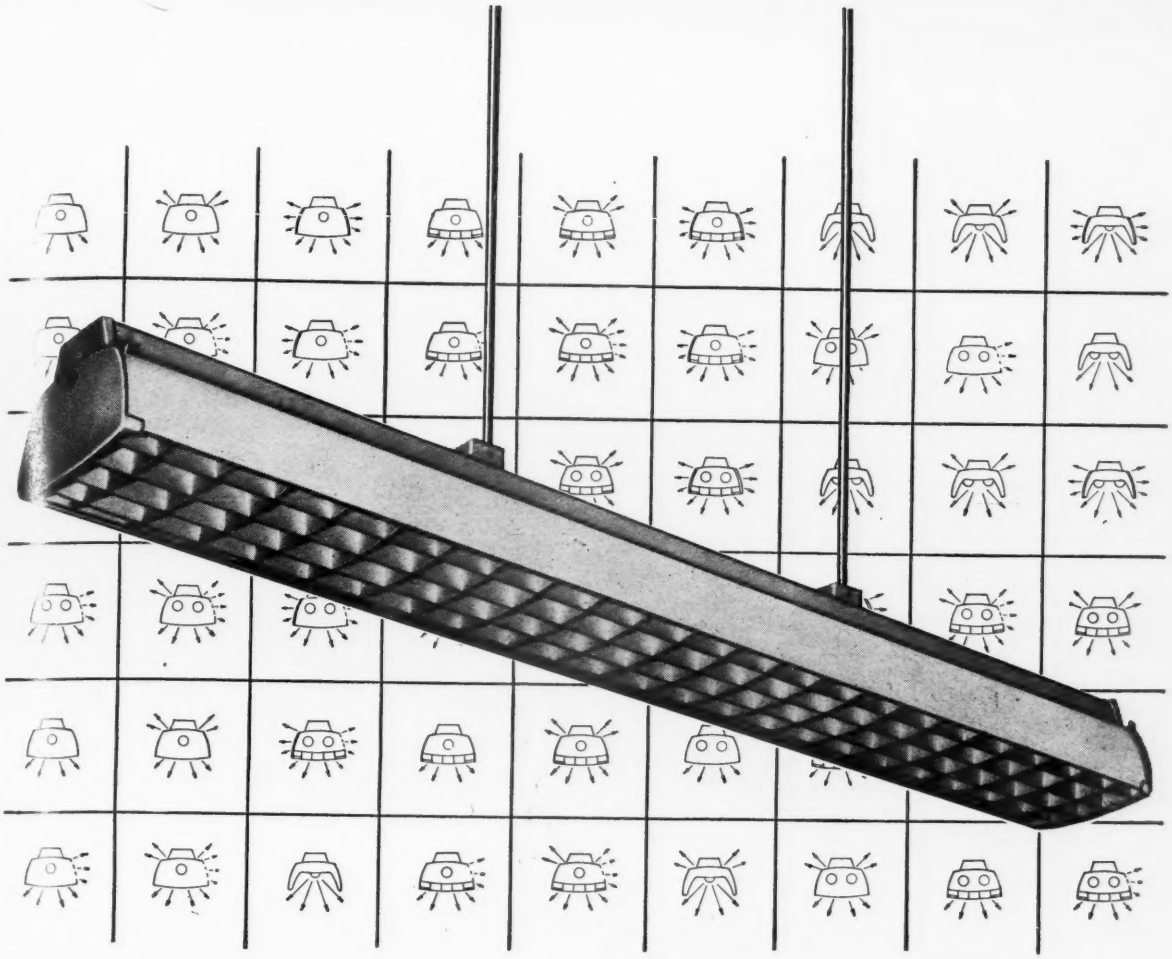

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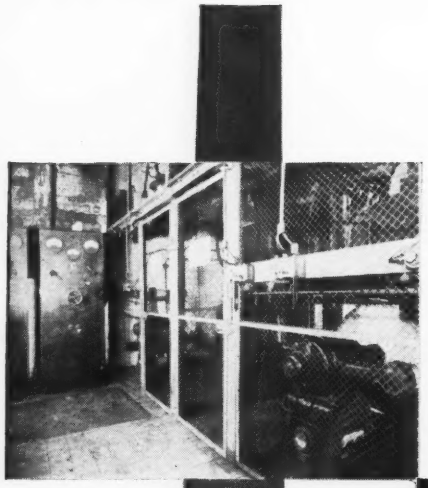

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electrostatic precipitators at Upper Boat power station

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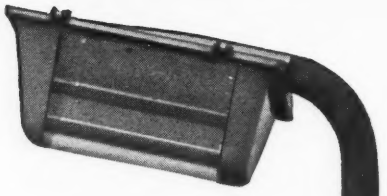

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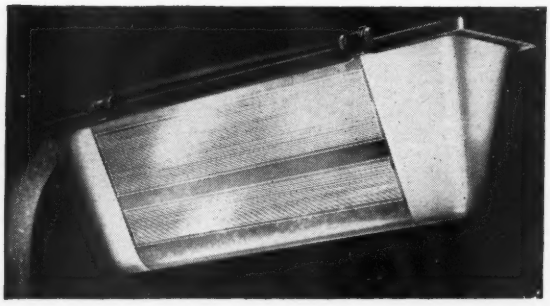
STREET LIGHTING LANTERN

FOR CRAWLEY NEW TOWN

The new street lighting lantern manufactured and supplied by The Edison Swan Electric Co. Ltd. and installed in the new town at Crawley has a clear 'Perspex' bowl with opalised ends. The light distribution is controlled by two machine-cut 'Perspex' refractor plates sealed to the inside of the bowl on either side of the lantern.



'Perspex' is the registered trade-mark for the acrylic sheet manufactured by I.C.I.

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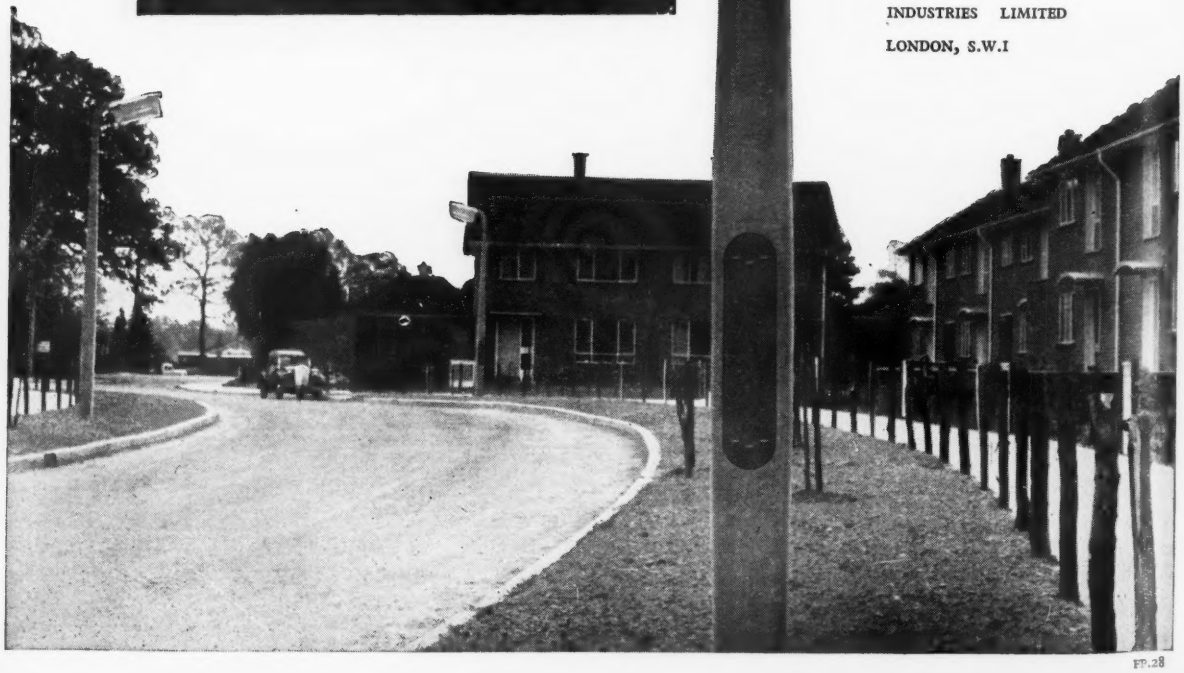
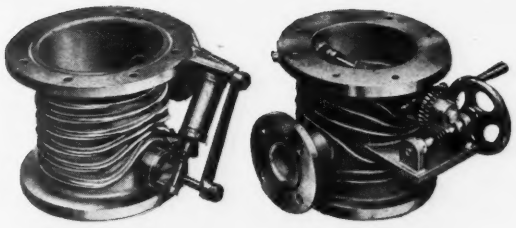


FP.28

Isolation Valves

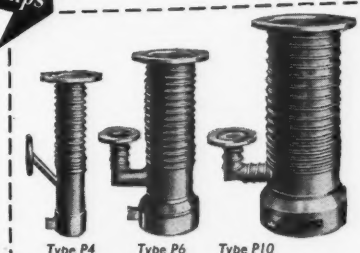
FOR HIGH VACUUM PROCESSING

Oil Diffusion Pumps

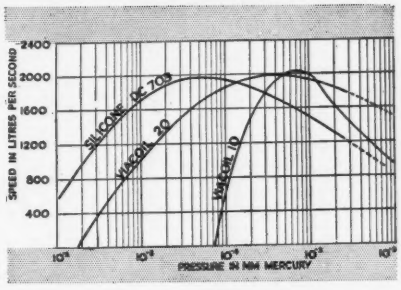


Type V6KA Type V6K

A complete range of diffusion pumps is available and includes types for the efficient movement of gases and vapours at low pressures with speeds from 50 to 5,000 litres per sec. To meet the needs of valving in industrial high vacuum systems, a range of vacuum valves is available. Straight through types, right angle types and valves with special bodies are designed for both manual control or automatic operation.



Type P4 Type P6 Type P10



Pressure/Speed Graph P10 Mark I Diffusion Pump.

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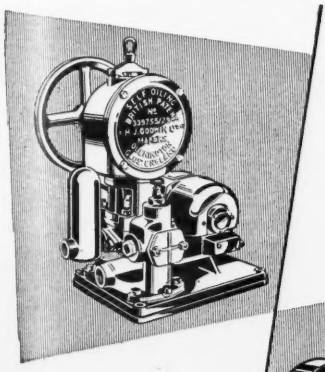
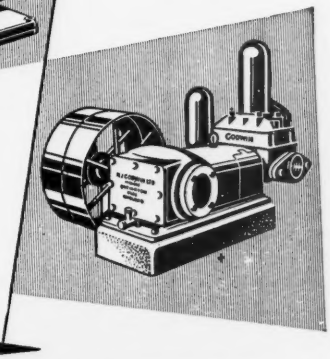


TYPE "AIE"

Patent Electric Domestic Pump for Suction Lifts up to 25 ft. 250/300 Imp. GPH to a total head of 80/120 ft. ALLOY PUMP BODY and many other exclusive features.



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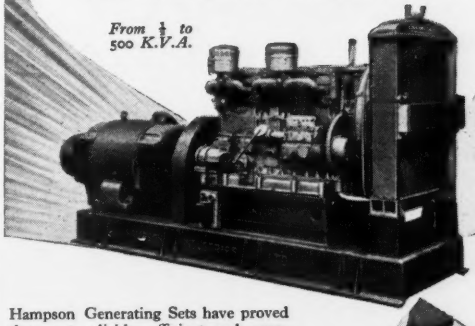
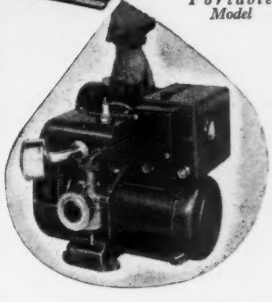
From ½ to 500 K.V.A.



Illustrated below is the Portable Model



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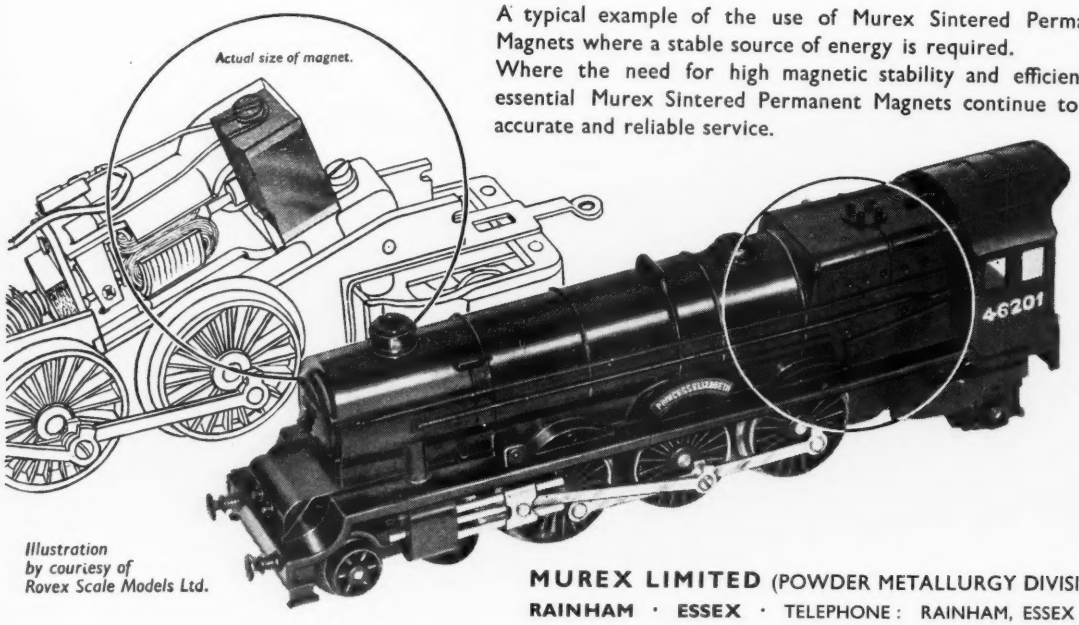
MUREX SINTERED PERMANENT MAGNETS
are used in this Tri-ang ELECTRIC MODEL TRAIN



A typical example of the use of Murex Sintered Permanent Magnets where a stable source of energy is required.
Where the need for high magnetic stability and efficiency is essential Murex Sintered Permanent Magnets continue to give accurate and reliable service.

Illustration by courtesy of Rovex Scale Models Ltd.

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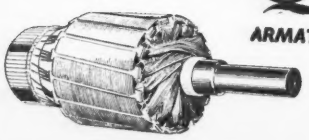

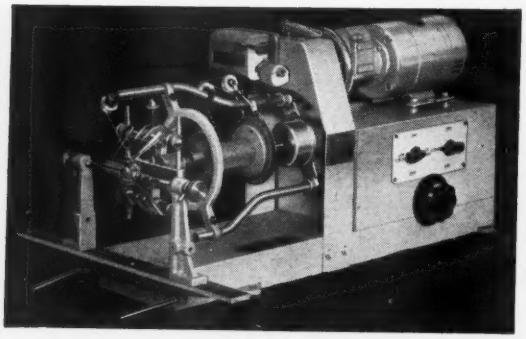

MODEL 1B
The machine illustrated is the "QUICKWAY" Model 1B designed for the electrical repair trade to wind two pole armatures up to 3" core diameter—2½" core length, and wire sizes between 45 — 24 S.W.G. Special models for production armature winding also available.
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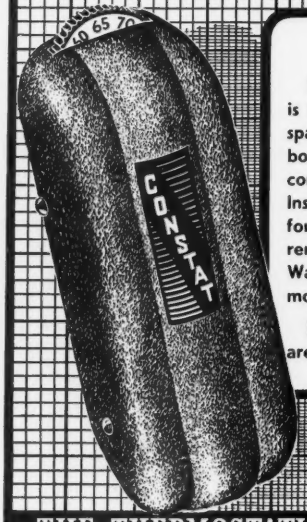

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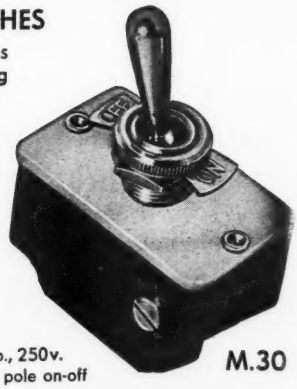
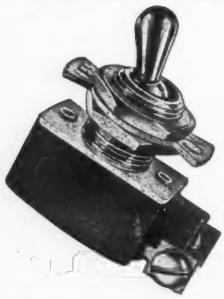


M.30

10-amp., 250v.
Single pole on-off

MINIATURE TOGGLE SWITCHES



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screw terminals

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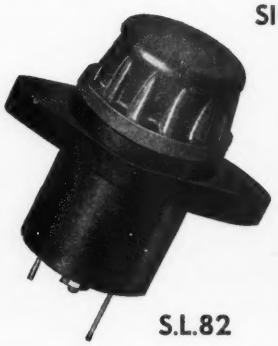

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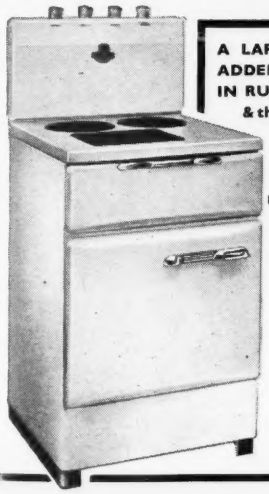

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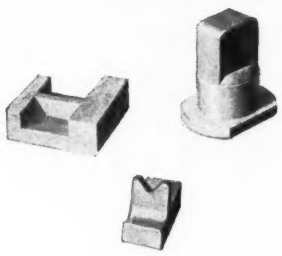

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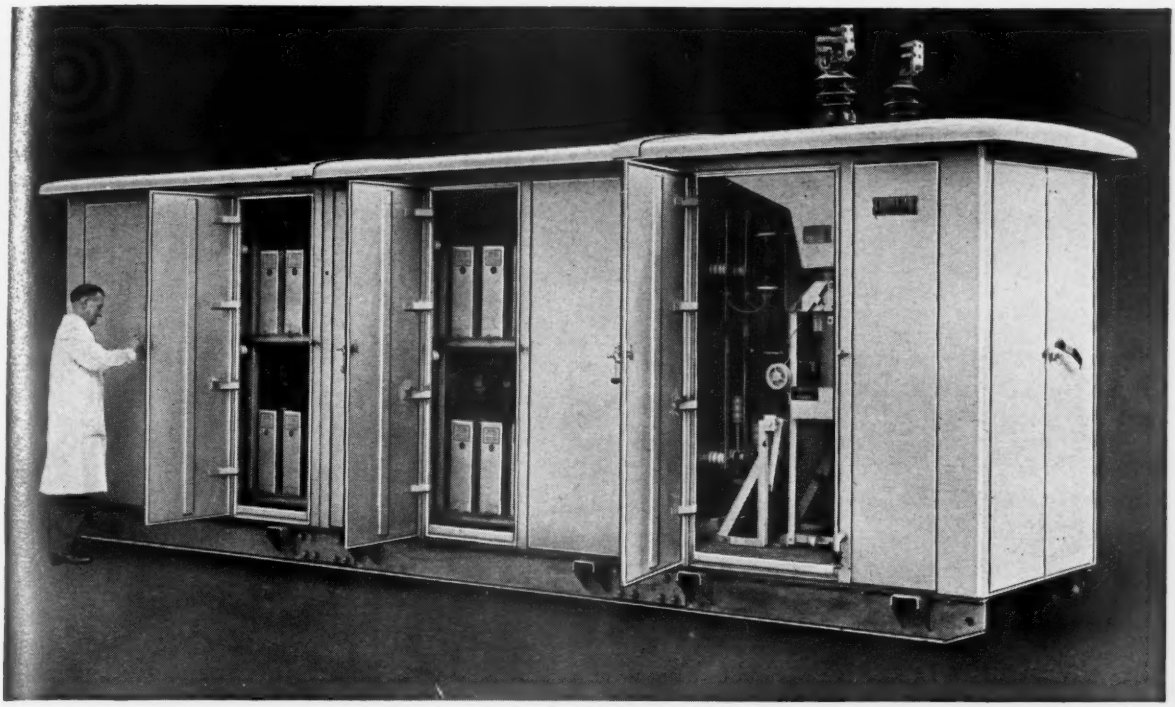

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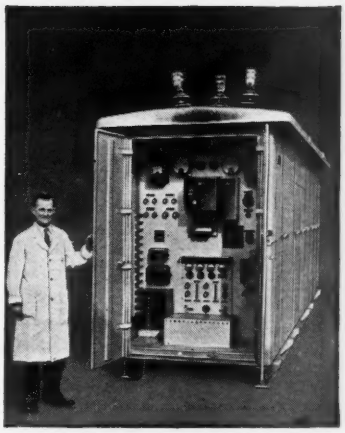

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D.104A

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24 SEPTEMBER 1954

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504 CONTRACT INFORMATION

VOLUME 155 ✧ NUMBER 13

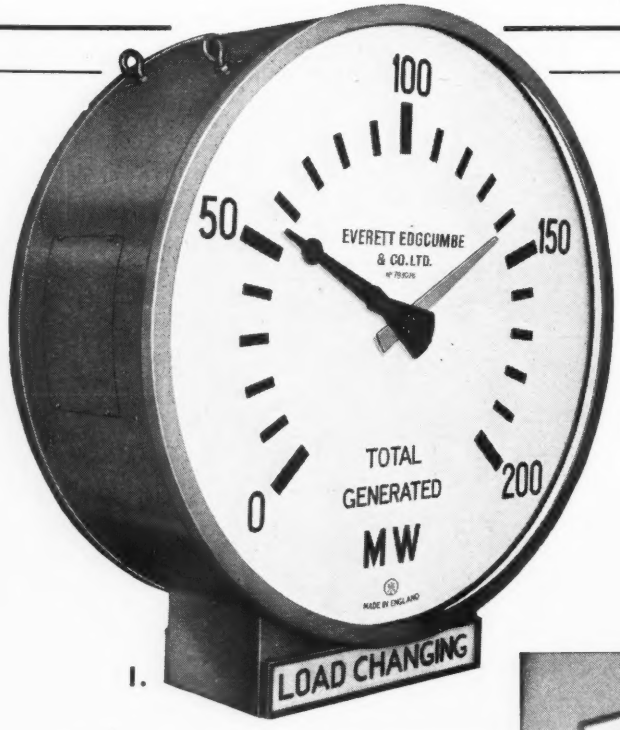
Eighty-Second Year of Publication

FRIDAY ✧ ONE SHILLING

133 CLASSIFIED ADVERTISEMENTS
144 INDEX TO ADVERTISERS

Editorial, Advertising and Publishing Offices: Dorset House, Stamford Street, London, S.E.1. Telegraphic Address: "Elecrev, Sedist, London." Code: ABC. Telephone No. Waterloo 3333 (60 lines). Registered at the General Post Office as a Newspaper. Entered as Second Class Matter at the New York, U.S.A., Post Office. Annual Subscription: Home and Overseas £3 6s 0d: U.S.A. and Canada $11.00. Cheques and Postal Orders (on Chief Office, London) payable to ELECTRICAL REVIEW PUBLICATIONS LTD., and crossed "Lloyds Bank."

Telemetering and Remote Indication



1.

Everett Edgcumbe design and make Summation and Telemetering Equipment for load and other indications.

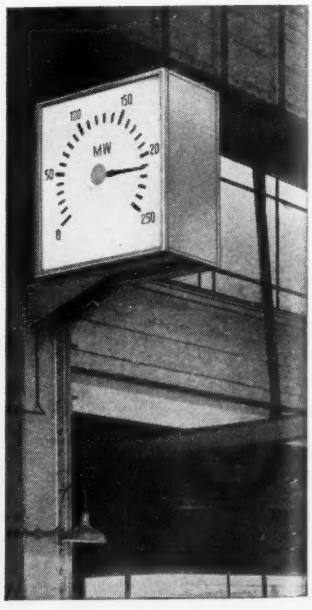
Each scheme is individually engineered and the method used, either electronic or electro-mechanical, is chosen to suit circumstances.

In some cases the complete circuit, including the giant indicators, has no contacts.

For Master Frequency indication and control see Cat. Sheet 197A.

2.

3.



The illustrations show some typical remote indicators—they may be either direct or Servo operated.

1. 40″ Diameter illuminated double sided summation indicator with remote controlled impending load pointer.

2. Turbine Room load indicator and clock in 4′ 0″ square illuminated cases.

3. 4′ 0″ square double sided illuminated total load indicator.

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ELECTRICAL REVIEW

24 September 1954 Vol. 155 No. 13 Established 1872

Work Worth Doing

THE inauguration last week of the Manchester–Sheffield electrified line again raises the whole subject of railway electrification, a subject which was comprehensively dealt with in our special issue of 21st May last. At present the only other work which is being actively pursued is the electrification of the Chelmsford and Southend lines. This, being virtually a " suburban " system, may be regarded as a special case, as is the Manchester–Sheffield scheme. There is also a prospect of electrification of the lines in the Glasgow area, and the extension of the Southern Region electric system to various points on the Kent and Sussex coast is contemplated.

All this is to the good, but is the work proceeding fast and far enough? Is not the matter one of considerable urgency in view of the coal position and the situation of the railways themselves? The steam locomotive is a most impressive machine and when we had a superfluity of coal its extremely low thermal efficiency was not a serious drawback. Now conditions are very different and it is appalling to find that railway operators are still seeking to improve the steam locomotive instead of cutting their losses by substituting a more efficient form of traction. The Manchester–Sheffield electrification (apart from its many other benefits) will save 100,000 tons of coal a year. It has been calculated that general electrification would save about 9 million tons annually; moreover the remaining consumption of 5 million tons or so would be of the low-grade type used in power stations.

But it is not only coal conservation which makes electrification essential. The British railway system is in an extremely run-down state and electrification would, by reason of its flexibility, solve many operating problems which now bedevil those who run the railways. Maintenance, particularly, would be greatly reduced; the handling of steam locomotives is a complicated and costly business while the work on electric stock is simple and comparatively inexpensive.

Electrification would cost a great deal but it is an investment which ultimately would be very remunerative. Mr. C. M. Cock suggested in our 21st May issue that the conversion of 280 route miles (a possible annual rate) would cost about £24 million, against which would be set a saving of £5 million in steam locomotive replacement. He pointed out that £24 million was only about 1 per cent of the total gross fixed investment of the United Kingdom for 1953. Such a programme would require 25 years for its completion and should be well within the country's capabilities.

This is a subject to which the Government and the British Transport Commission should be giving more earnest attention than they appear to be devoting to it at present.

COAL PROSPECTS

Little hope of improvement in coal supply comes from the mining industry itself. At a conference of Chambers of Commerce at Sheffield last week Sir Hubert Houldsworth, chairman of the National Coal Board, again made a gloomy survey of the situation. Four main problems faced the Board, he said: lack of productive capacity, shortage of technicians, an inadequate labour force and difficulties in "human relations." The only way he could suggest of making up the shortage of coal was by using the fuel more efficiently, thereby saving between 9 million and 20 million tons yearly. "Human relations" and manpower shortage were also considered to be principal factors by Mr. Ernest Jones, president of the National Union of Mineworkers, in an address to the N.C.B. Summer School at Oxford last week. He said that the major part of the loss of 900,000 tons in the first half of this year was attributable to piecework disputes which showed the need for an improved wages structure. For some reason he put the term of the present coal shortage at five years but did not state definitely how the problem would by then be solved. Like so many other people he ventured on prophecy about the atomic future. It would be three generations before atomic fuel challenged coal and it would cost £15,000 million to equip industry for the use of atomic power.

B.E.A. AND FOREIGN COAL

The following comment appeared in the *Journal of Commerce* (Liverpool) last week:—

> "We do not know exactly how much French and German coal is being brought to some of our power stations from near Continental ports in colliers owned by Britain's nationalized electricity supply industry but we do know that such shipments provide further confirmation of our unhappy coal position."

Upon inquiry of the British Electricity Authority we find that none of the Authority's colliers is being used for this purpose. Imported coal is being used to a very small extent at power stations. Last year the amount was about 100,000 tons; it consisted mainly of screenings from coal imported by the National Coal Board for domestic use. It is, of course, unfortunate that even this small quantity of foreign coal has to be used but that is not the fault of the B.E.A.

DEARTH OF TECHNOLOGISTS

We feel compelled to return once again to this urgent and serious subject on account of an attitude of mind evinced in the addresses on "recruitment to the engineering profession" at the recent Oxford meeting of the British Association, reported elsewhere in this issue. Mr. Donald Lindsay, headmaster of Malvern College, asked if it was the business of the independent and maintained grammar school to produce engineers and members of other professions, etc. While, no doubt, recruitment to certain professions was a matter of national concern, what was the headmaster to do about it? Formerly the aim of a school was to turn out educated men; it was not primarily concerned with vocational education. Of course, it is not the business of the ordinary school to produce engineers; indeed it is not equipped to do this. But nowadays for a large proportion of students some education in basic science is necessary. Further, the school should ensure that its pupils are aware of the possible openings for them in every sphere of life and of the position regarding careers in the country as a whole.

SELENIUM SUBSTITUTES

A D.S.I.R. survey reviewed in this issue contains much information about selenium which is not generally known. Its main purpose is to draw attention to possible substitutes for selenium, particularly in the production of rectifiers, in view of the comparative scarcity of this semi-metal. Upon the whole the authors are not favourably inclined towards any of the substitutes which they mention and it would seem that they have not given full credit to those who are working on these substitutes. They say:

> "It has taken 30 years to produce the modern selenium rectifier, and it may easily take as long to develop an alternative material to the same degree of perfection."

Reference is made to the basic research being carried out on crystal rectifiers (germanium and silicon) and it is conceded that it is possible that rapid developments in this field will soon be made though it is thought likely that no crystal rectifier commercially competitive with the selenium rectifier will emerge for at least five years.

INTERNATIONAL STANDARDS

Some additional interest attached to this year's series of group meetings of the International Electrotechnical Commission in the United States in that it is now fifty years since the foundation of that body. The function of the I.E.C., which constitutes in effect the electrical division of the International Organization for Standardization, is to prepare model specifications for electrical equipment and materials for consideration by national committees. The British Standards Institution (whose annual report is reviewed in this issue) is responsible for the committee representing this country. In recording our appreciation of the invaluable part played by the I.E.C. throughout its existence in stabilizing electrical progress, we take the opportunity of announcing that we propose, as in previous years, to publish an account of the present proceedings of the technical committees and sub-committees by a delegate who has enjoyed special facilities for assessing the most noteworthy features.

LOW TEMPERATURE HEATERS

Continuing our series of illustrated surveys of domestic appliances, the next, to be published on 1st October, will deal with low temperature space heaters. As before, information will be given in tabular form and will include details of the type, size, elements, method of control, finish, prices and purchase tax. In view of the demand for these surveys for reference purposes, orders for additional copies of the *Electrical Review* should be placed without delay. The next survey (22nd October) will cover thermal storage water heaters

El trical Review 24 September 1954

Supergrid Line Construction

Methods Employed on the Tilbury to Elstree Section

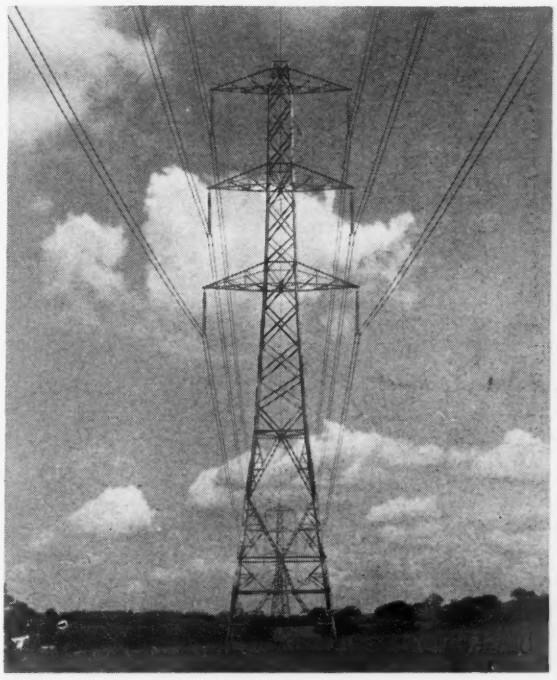
By J. M. BESKINE, B.Sc.(Eng.)

THE Tilbury to Elstree overhead line, which is now nearing completion, will be the first of the British Electricity Authority's 275/380 kV lines with twin circuits and double conductors, each of 0·4 sq in cross-section. The main contractors, the J. L. Eve Construction Co., Ltd., were faced with a number of new problems during the construction of this 45½-mile line, and have employed new techniques, some of which are already being adopted by overhead line contractors in general. This brief report summarizes some of the problems encountered and their solution.

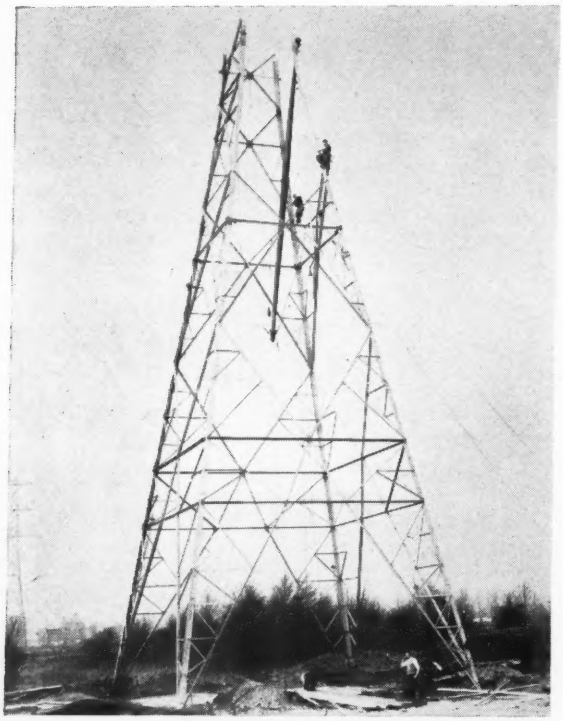
To enable large blocks of power to be transmitted,* notwithstanding the increased voltage as compared with the original grid network, heavier conductor cross-sections were necessary. On the 132 kV lines the sectional area of conductor per phase is 0·175 sq in. In the North of England, from Staythorpe power station, near Newark, to West Milton, near Sheffield, there is already in operation one 41-mile length of 275 kV line, the only one completed to date. However, this differs from the Tilbury to Elstree line in that it has much lighter conductors. The Staythorpe section is a single circuit line with twin 0·175 sq in conductors; there are seven strands of steel and 30 strands of aluminium. On the Tilbury to Elstree line there are twin conductors, each of them much heavier than those used hitherto, and what is probably of greater importance from the point of view of constructional problems, the ratio of aluminium to steel is much greater; there are seven strands of steel and 54 strands of aluminium. These differences necessitate an improved sagging technique, as described below.

To carry these much heavier conductors larger and heavier towers are necessary. Furthermore, to permit the operating voltage to be stepped up from 132 kV to 275 kV and ultimately to 380 kV, a much greater conductor spacing is required, and this again necessitates a greater overall tower width. To carry the increased weight and tension of the conductors at an increased distance from the vertical centre line through the tower, the tower itself has to be relatively stronger than the original 132 kV structures. These factors influence stringing technique, especially sagging operations, because of the effect of tower twist.

Above: Part of the Tilbury to Elstree supergrid line showing a section tower. Below: One of the straight line towers showing arrangement of twin conductors



* The capacity of the Tilbury to Elstree line at 275 kV will be approximately six times that of a standard 132 kV line.



Erection of a supergrid tower with the aid of a floating derrick

	275/380 kV	132 kV
Overall height of tower above ground ...	134ft 6in	86ft 6in
Horizontal spacing of bottom conductors ...	40ft	24ft
Vertical spacing, top to bottom conductors ...	51ft 3in	25ft
Weight of steel tower	12 tons	3¾ tons
Sectional area of conductor per phase	0·8 sq in	0·175 sq in
Spacing between twin conductors	12in	—

The very size and weight of the supergrid towers and of their assemblies, as well as the vertical distances involved, present additional problems during tower erection.

The accompanying table gives comparative dimensions for the new supergrid and the older grid lines and towers; in both cases normal straight line towers are being considered.

It must be remembered that all towers have standard extensions which can be added to them. The tallest tower on the new line is approximately 170ft in height. In some cases these tall towers have to be erected in very inaccessible sites, for example, in the middle of a flooded ballast pit. The maximum weight handled during tower erection is now about 30 cwt, about twice that for the 132 kV grid towers, and this increased weight has to be raised to much greater heights, well over 150ft.

New Techniques

Among the new problems encountered the following may be listed: Sagging four conductors at once; prevention of clashing between twin conductors per phase; tower erection in confined sites; running out thirteen conductors at once; and pulling conductors over crops and over extensive areas of commercial greenhouses.

The technique of erecting tall towers on isolated sites was described in a paper read before the Institution of Civil Engineers in 1945, by the late Mr. J. L. Eve, M.I.E.E., M.I.C.E., and Mr. R. C. Brown, B.Sc., M.I.C.E. This technique calls for the use of a special floating derrick. This device is for erecting tall towers on island sites and was designed by the engineer in charge of construction on the Tilbury to Elstree line, Mr. G. R. McCullagh, B.Sc., M.I.E.E. It is 50ft long, shaped somewhat like a hollow cigar, with sides of 12-gauge steel and ball bearing mounted ends at top and bottom. It is hitched into position approximately vertically, in the centre of the tower site, after erection of the first lift. As the height of the tower increases the position of the floating derrick is raised. Its function is to enable steelwork to be hoisted into position without the use of external guy lines, i.e., it acts as a self-supporting jib. The floating derrick is moved over to one side of the tower or the other as required for hoisting sections weighing up to about 30 cwt. Its movement is controlled by guy lines and three and two blocks inside the tower legs.

During construction of the Tilbury to Elstree line the use of a floating derrick enabled angle towers to be sited under conditions which would have been extremely difficult to cope with in any other way. One example was that of a 150ft angle tower weighing 22 tons which was erected on a narrow spit of land with only just sufficient room for the tower foundations.

Sagging problems are accentuated by unpredictable

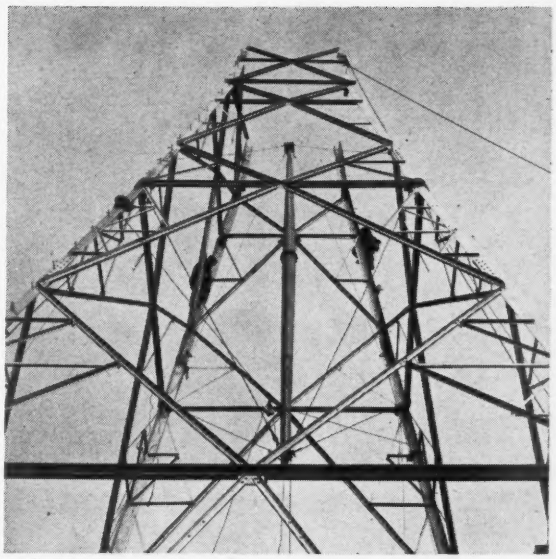
Specially designed winch tractors are employed for stringing and sagging a number of conductors at once

conductor stretch, variable pulley block friction and tower twist during sagging. The problem is to get the pairs of phase conductors at 12in centres to have dead equal sags. The amount of stretch in each conductor is unpredictable because of the non-elastic stretch of the aluminium and the increased ratio of aluminium to steel compared with 132 kV conductors. Each section of the Tilbury to Elstree line is up to two miles long and there may be as many as nine intermediate towers between angle towers. There are thirteen conductors in all, each of which is liable to be affected differently by variable running block friction as well as by unpredictable stretch. It can be appreciated, therefore, that it is no easy task to get all six pairs of conductors sagged exactly equally.

Tower twist complicates the problem even more. Because some of the tower steelwork is of high tensile steel, higher stressing is employed than on 132 kV towers and this in turn leads to increased deflection during sagging operations. The greater height and cross-arm length accentuate the leverage due to sagging and the total deflection at angle towers, which may be as much as 8 inches at angle tower cross-arm ends.

The creep in conductor length and the increase in angle tower cross-arm deflection as each wire is sagged make it difficult to match one conductor of a pair with the other, unless both are sagged together. But if two conductors are sagged together, the torque at the angle towers at the ends of the section is large enough to produce deflections which are not completely eliminated when the opposite pair of conductors on the same cross-arm are sagged. This is due to slip in the tower bolt holes. Because of this, it is not likely that accurate sagging can be carried out unless all four conductors on one cross-arm are sagged simultaneously.

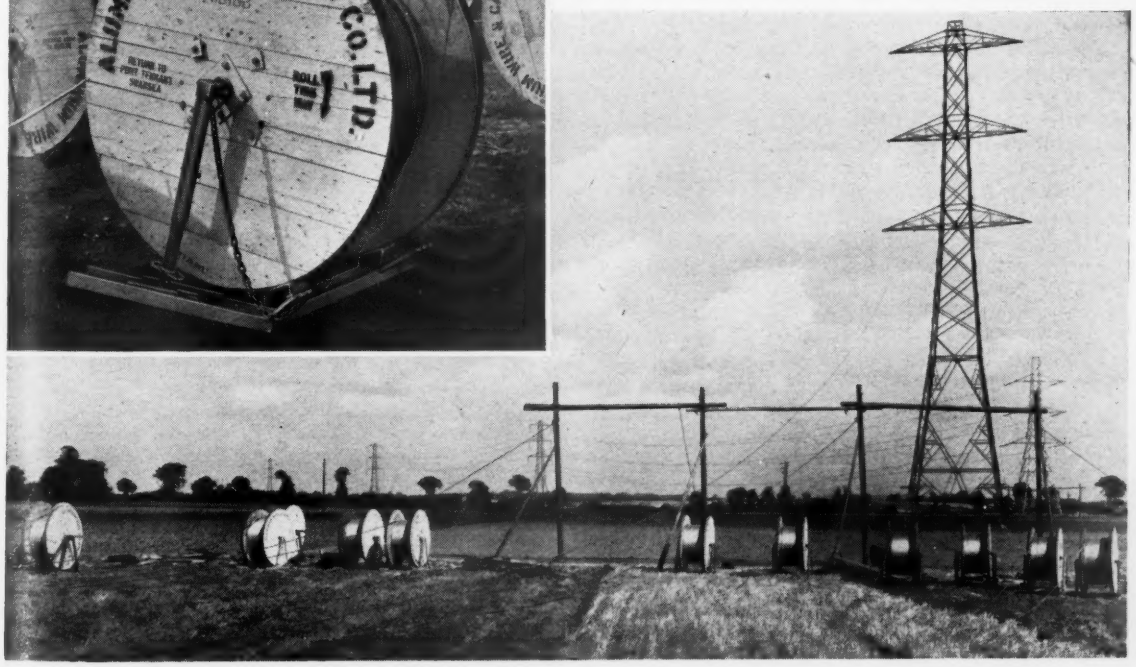
Previously it was the practice to sag conductors one at a time, although they were often run out one, two or three



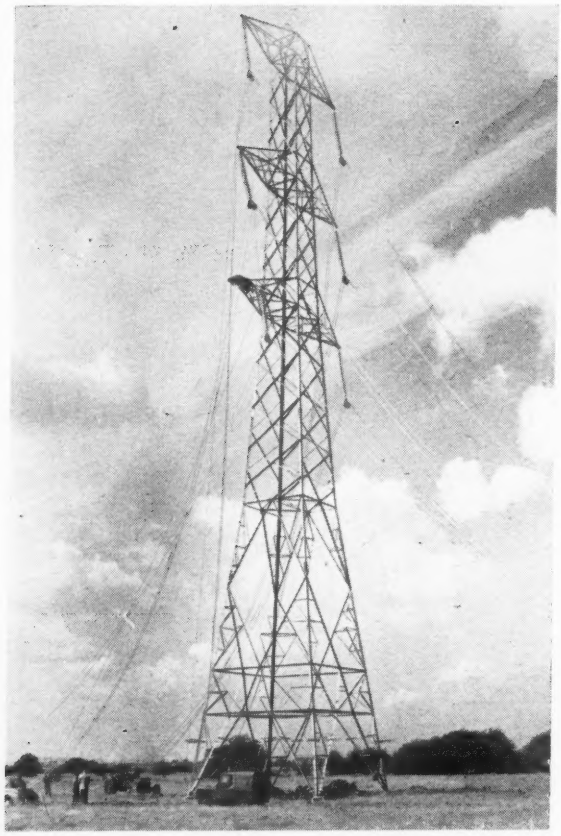
Close up of floating derrick which is 50ft long and enables tall towers to be erected on restricted sites. The tallest tower of this kind on the new line is about 170ft high

at a time. On the Tilbury to Elstree line the conductors were sagged four at a time. Those on the top cross-arm were sagged simultaneously, followed by those on the second cross-arm, and so on. A number of specially designed devices and techniques were developed to enable this to be done with accuracy and speed, and to meet the requirements of the British Electricity Authority.

Special purpose sagging equipment employed includes the following: 6-ton winching tractors, equalizing blocks, and cam sag adjusters. Specially built elongated Fordson Major tractors with winches and earth anchors are em-



Left: The Swedish type self-braking drum stand. Below: All thirteen conductors can be run out at once where conditions permit



Conductors and suspension insulators being attached to cross-arms

ployed for sagging four conductors at once. Each pair of conductors is looped by a steel rope round a block before marking and cutting to length. The block equalizes the tensions on the pairs of conductors in one phase, subject to subsequent final adjustment. A marking square is employed when determining where to cut each conductor.

The conductors are attached to the insulator sets by compression clamps. For final tensioning of the conductors a specially developed cam sag adjusting plate is employed. This is a J. L. Eve design and consists of a cam plate with holes so arranged around the curved edge as to provide an increasing length as the cam plate is turned. These adjustment holes give a variation in length in steps of $\frac{1}{4}$in each, up to a maximum of $1\frac{3}{4}$in. Further adjustment is obtained in 2in steps on extension straps.

All thirteen conductors on the Tilbury to Elstree line were run out simultaneously wherever this was at all possible. The drums of wire were mounted on a row of self-braking drum stands. These are Swedish in conception but have been modified, this being the first time that such drums have been employed in Britain. The drums are mounted in such a manner as to produce an automatic braking effect as soon as the tractor ceases to pull the conductor. This reduces the number of men required to the minimum necessary for watching the drums to see that the wire leaving each drum is not trapped by loose coils of wire owing to the momentum of the revolving drum.

Specially designed bridles are employed. It is possible to run off twelve wires simultaneously in this way, and thirteen wires when the position of the earth wire permits it to be joined to the conductor pulling-out bridle. Each bridle takes six or seven wires and two bridles are employed at the same time. The conductors are laid out in parallel paths at about 6in centres and there is no danger of, for example, getting the conductors for the middle cross-arm mixed up with those for the top cross-arm.

Two types of tractor are employed for pulling out the conductors. A pneumatic wheeled winch tractor can be employed, or a crawler tractor fitted with a heavy duty winch. On the Tilbury to Elstree construction sites a Cuthbertson Buffalo soft land crawler tractor was employed as well as a number of wheeled winch tractors, the latter being specially built for the J. L. Eve Co. by Auto Mowers.

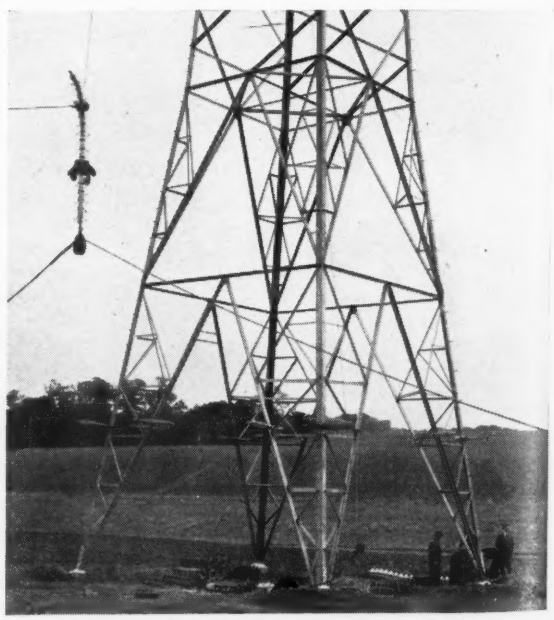
Heavy duty winches mounted on wheeled or crawler tractors are of particular value when it is necessary to pull conductors over crops without the tractor going into the field concerned, or when crossing large inaccessible areas such as large acreages of commercial greenhouses. Many crossings of this kind were necessary during construction work and it must be remembered that where possible these were negotiated with all thirteen conductors at once.

Linesmen now have to travel the whole length of every line conductor. This is to fit spacers between each pair of conductors in one phase, so as to keep them 12in apart. Spacers must be fitted in each span, at points not more than 330ft apart. Normally three or four spacers must be fitted per span of twin wires. A specially designed bosun's chair is employed for conveying the linesman along the wires. This runs on aluminium pulleys which are softer than the conductors and so do not cause scoring, etc. The chair is exceptionally light and at the bottom of a suspension set it is easily taken by a linesman from one side to the other, in one hand. The linesman is pulled along the wire by a boy with a towing rope.

A word or two should be said about vibration dampers. Normally one pair is fitted to each conductor, but where the spans are greater than 1,400ft, a second pair is fitted, at carefully measured points.

Materials supplied for the Tilbury to Elstree line, to B.E.A. specifications, are by the following companies: Towers, Blaw Knox, Ltd.; insulators, Pilkington Bros., Ltd.; conductors, Aluminium Wire & Cable Co., Ltd.; conductor fittings, Northern Aluminium Co., Ltd.; and vibration dampers, Switchgear & Equipment, Ltd.

Raising a suspension unit on an intermediate tower



Automatic Train Control

SWISS MOUNTAIN RAILWAY EQUIPMENT

From a Correspondent

This article discusses some features of the all-electric Rhaetian Railway and in particular the electric actuation of points and automatic signal locks. Telephone installations and remote control of lighting and other services are also described.

THE Bernina Railway, which is part of the Rhaetian Railway system, crosses the Engadine mountains between Switzerland and Italy via the Bernina Pass (7,600ft above sea level). Some 38 miles of track is operated, nearly half of which has gradients of the order of 1 in 14.

The traction motors are supplied with 1,000 V d.c. via pantographs from twin 0·1 sq in cross section overhead conductors supported at roughly 30 yd intervals. Earth return is by the track. There are four mercury vapour rectifier substations, fed from the railway's own 23 kV 50 c/s overhead transmission lines.

Another section of the Rhaetian Railway, comprising about 180 track miles, connects the Engadine mountains with Chur and other parts of the Grisons area; a.c. traction motors are employed here, the supply being 10 kV at $16\frac{2}{3}$ c/s.

The whole route (1 metre gauge) is single line and the traffic is relatively heavy. Therefore, faultless control of points and signals is vital. Operations are very much complicated by winter conditions and in the past avalanches have caused loss of life and equipment; snow depths of five or six feet are common, and drifts of several times this depth can be formed in a single night.

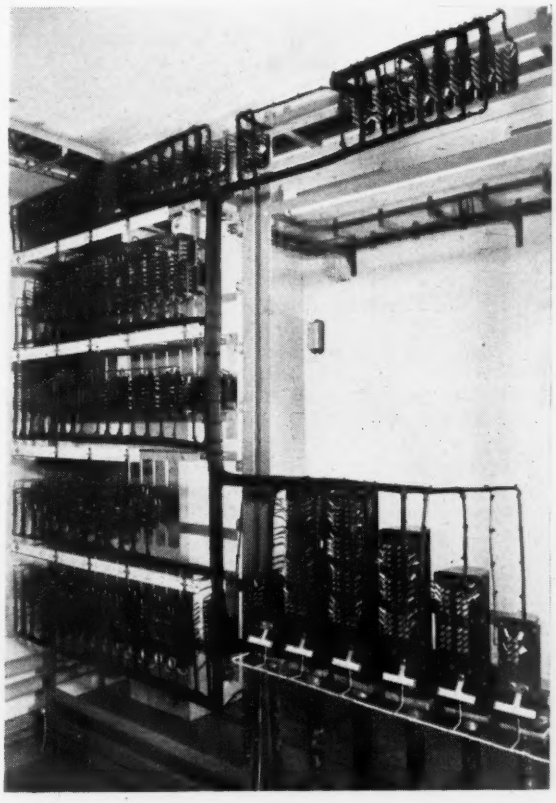
Points Control and Signalling

The first electrically operated points were installed in 1932 at Klosters station. At present, many of the important stations are provided with electrically operated points and automatic signalling equipment.

Fig. 1 shows a typical points installation. The actuating equipment (made by the Integra Company, of Wallisellen, near Zurich) is contained in the box seen in the foreground. It comprises a 0·5 h.p. 2,000 r.p.m. split field a.c. commutator motor driving a large pinion via a friction clutch and spur gearing. The points themselves are operated from the pinion by a rack. Cam operated limit switches are provided which disconnect the motor when the points change is completed. The same limit switches provide control signals to the operator's panel, so arranged that an audible warning signal (electric bell) is heard as long as the actual points position does not correspond to the selected position. Furthermore, if the points are forced open by a vehicle travelling in the reverse direction,

Fig. 1.—Electric points installation. The box in the foreground contains actuating mechanism, including 0·5 h.p. motor, friction clutch and limit switches. Connection to rails is through a large rack and pinion

Fig. 2.—Part of a relay room. Connections are made via distribution blocks (lower right) to points and signal relays (upper left) and train position indicator relays (lower left)



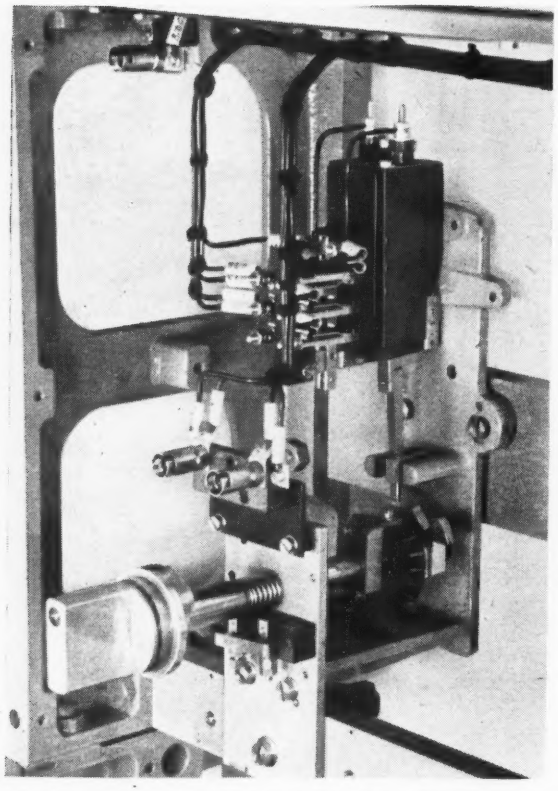


Fig. 3.—Detail of switch locking mechanism. The solenoid holds the plunger away from the cams on the signal or points switch shaft

the control circuit is short-circuited through limit switches, a fuse is blown and visible and audible warning devices are actuated.

In large stations, such as St. Moritz or Landquart, it is sometimes convenient to be able to control the points either from the control cabin or, for shunting operations, from a set of push-buttons situated near to the track. These push-buttons are normally immobilized. A switch in the control cabin puts them into circuit, provided such local operation is selected by a switch adjacent to the buttons. Thus, the control cabin retains overall control at all times, but can delegate it to the yards when desirable.

All points control signals and positional feedback signals from the points are brought through multi-core underground cables to relay panels, usually situated in a dustproof room in the station buildings. Fig. 2 shows part of a relay room. Cables are seen entering on the lower right, terminating in distribution blocks. On the left are mounted the relays (made by the Integra Company), which have 36 V operating coils. Power is supplied from batteries on permanent trickle charge, with manual changeover to fast charging rate. Supply to the battery charger (just visible in the lower left of the picture) is normally derived from the overhead transmission system through pole mounted stepdown transformers; automatic changeover to the local 220 V 50 c/s supply takes place if the railway's supply fails.

Train Position Indication

Near each points installation, a section of one rail is isolated from earth; 12 V d.c. is applied to this through a 28 ohm resistance. The rail is also connected to one end of a relay coil whose other end is earthed. A short circuit is established via the wheels and axles to the other (earthed) rail when a train passes, so that no voltage is applied to the relay winding. Normally closed contacts on the relay complete the circuit to a " section occupied " indicator lamp on the control panel. The isolated rail is longer than the wheelbase of the longest rolling stock, so that the " section occupied " lamp cannot become extinguished when a train comes to rest.

A further train-position indicating system is shortly to be supplied by the Integra Company. This will comprise two isolated lengths of rail connected to a relay counter circuit. The circuit logs up the number of axles which have passed into the section and will give a " section occupied " signal. The section will not again be indicated as " unoccupied " until the same number of axles has left the second isolated rail at the end of the section, and the total count has been reduced to zero.

Signal and Points Locks

When a route has been selected for an incoming train by a suitable combination of points settings, an electromechanical lock (Fig. 3) is removed from the switch controlling the red-green signal lights. The lock consists of a solenoid-operated plunger which engages with a cam on the switch shaft. If, however, one of the required track sections is already occupied, signals derived from the isolated rail circuit cause the electromechanical lock to hold, so that " green " cannot be given.

Similarly, once the signals have been set to " green," electromechanical locks clamp all the points switches involved. For this application, the plunger is made to fall between two cams on the switch shaft. The lock remains in position until a train has passed and " red " is again given. In case of emergency only, the points can be reset before the train has passed, by operating a sealed switch. A complete control panel is shown in Fig. 4.

The points and signal locks may be set semi-permanently to maintain a selected " straight-through " track while the station is unattended. Power supply failure, even involving both the railway's and the alternative local electricity supply, cannot affect the points setting.

Telephone Communication

Carrier frequency communication systems have been used experimentally, but separate conductor pairs were

Fig. 4.—Control console. Points switches and pilot lamps on horizontal panel. Train positions are indicated on station map

ultimately retained. These are open wire overhead lines where possible, and underground cables for the sections most exposed to avalanches. To ensure reliability under conditions of snow loading, heavy gauge ($\frac{1}{8}$in diameter) conductors of copper bronze are used in some places.

Extremely thorough transposition of overhead telephone conductors has been carried out. Furthermore, the telephone conductors are run at a distance of over 20 yd from the track wherever possible. Line amplifiers are provided at Samedan, the northern end of the Bernina Railway, but no intermediate repeaters are used. Hardly any background noise was noticed when making several telephone calls over distances up to 40 miles, even though a number of trains were moving parallel to the telephone conductors.

There are 21 automatic telephone exchanges in the railway's system. All the telephone installations are protected against accidental contact between telephone conductors and power lines by gasfilled spark gaps (manufactured by Licht A.G., Goldau), rated at 500/600 V and by non-linear transformers insulated for 4 kV.

Great cleanliness was noticed in the automatic telephone exchanges and relay rooms, which have thermostatically controlled tubular heaters. Inspection and contact cleaning are carried out annually. On a particular section of the line, none of the uniselectors or relays has had to be replaced because of electrical faults during several years' operation.

Station illumination and other services are controlled from push-buttons in the control cabin. These buttons operate double acting solenoid controlled breakers rated at 10 + 10 A 380 V (manufactured by Ghielmetti & Co., of Solothurn). The solenoids operate on 24 V d.c. and draw 10 mA. Time switches with built-in compensation for the variation of daylight period throughout the year control the platform lighting of stations unattended at night.

Thanks are due to Mr. Lutz, head of the Rhaetian Railway's Safety Division, for permission to publish this article, to Messrs. Knellwolf, Caduff and Tischhauser of the Rhaetian Railway for much valuable information, and to the Integra Company for the photographs.

Engineering in Europe

Abstracts from Foreign Technical Journals

THE transfer of reactive power between interconnected systems can be controlled by various methods and two of these are described by the author. The coupling transformers are generally regulating transformers with on-load tap changers. These are best controlled automatically by a reactive power regulator (step regulator) of an insensitivity exceeding the variation of reactive power produced by moving one step on the tap changer; otherwise regulator oscillations may be caused.

The actual effect of such tap changes depends on the configuration and instantaneous operating conditions of the interconnected systems and for this reason the reactive power regulator must be co-ordinated with a voltage regulator and both controlled by a supervisory element inserting one or the other regulators into the circuit as required by the instantaneous situation. This method, essentially a constant-voltage regulation, is rather complicated and the transition between the two regulators is never smooth.

There is a simpler method in which the reactive power regulator is supervised by a voltage control relay correcting the actions of the reactive load regulator when the voltage variations exceed certain limits. This method is based on a constant value of the reactive power. The author treats the general characteristics of under-excited synchronous machines as an introduction to the discussion of the regulation of their excitation as a function of the load angle on which experimental results are given, particularly referring to correct and incorrect resynchronization after loss of synchronism and the consequences for the flow of reactive power. It is found that this kind of regulation is the safest method of reactive power control and, provided the stabilizing additional regulating function is chosen correctly, will prevent any incorrect resynchronization when one pole has been "slipped."—"Introduction to the Practical Solution of Problems of Stability and Reactive Power," R. Noser, *A.S.E. Bull.*, Vol. 45, No. 15, pp. 617–625, 24th July, 1954, in German.

Readers who require accurate full translations of any of the articles abstracted in this section can be put into touch with the translators who will supply them at current rates.—Editors, *Electrical Review*.

Corona Losses

In the introduction the author discusses the limits of the validity and accuracy of Peek's and Peterson's formulae for corona loss and then the two methods of measuring these losses, viz. the loss angle (tan δ) measurement, preferably by Schering bridge, and direct loss measurement by wattmeter, with the necessary precautions to be taken (screening of the measuring set-up by a Faraday cage). The main part of the paper is a report of actual measurements made for elucidating the effect of atmospheric conditions, particularly moisture, rain, etc., and also the influence of various conductor types on the loss figure.

The measurements were always made on single-phase lines, since it is possible to convert results obtained for a single conductor to any arrangement of conductors of the same type by a simple relation found by Potthoff, according to which the product of critical disruptive corona voltage and service capacitance of the conductor arrangement remains constant or, expressed in another way, the voltages at which equal corona losses occur for two different conductor arrangements (with the same conductor type and section) are in the ratio of the service capacitances of the respective arrangements.

All the tests showed that rain presents the most unfavourable condition, increasing the corona losses very considerably and reducing the critical disruptive voltage in some cases to half the value. The method of system earthing is also important; it was found that Petersen coils are no longer effective at voltages above 220 kV owing to the large residual corona currents. The influences of moisture content of the air and of the air pressure are less important, nor are snow deposits very dangerous. Hard frost, on the other hand, has even worse effects than rain.—"Corona Losses on H.V. Lines," O. E. Gerber, *Scientia Electrica*, Vol. 1, No. 1, pp. 27–39, 1953, in German.

INDUSTRIAL GENERATION

Power from Waste Heat and Additional Heat

By G. K. ALSTON, B.Sc.Eng., M.I.E.E.*

THERE appears to be a certain amount of confusion in the minds of some works engineers between the industrial generation of electricity (*a*) from waste heat and (*b*) in conjunction with the provision of steam for process heating requirements. It is the purpose of this article to discuss the fundamental differences between (*a*) and (*b*) and, though much of the information will be obvious to many engineers, it is presented in the hope that it will help others who are less familiar with such matters.

There are two important groups of industries in which electricity can often be generated economically by the use of waste heat or by the provision of additional heat over and above normal requirements. A very large proportion of the industry of Britain uses heat in one form or another and wherever heat energy is available it can, if the temperature is sufficiently high, be converted to electricity.

The extent to which heat is useful is governed by its potential; 1,000 lb of steam at 80 deg F is useless for electricity generation, but 1,000 lb of steam at atmospheric pressure can be converted to 40 kWh. The same 1,000 lb of steam at 400 deg F (and, say 40 lb/sq in) can be converted to 70 kWh and again the same quantity at 1,000 deg F (900 lb/sq in) to 140 kWh. From one extreme to the other the total heat content of the steam above 32 deg F has varied by only 38 per cent and yet on the one hand it is useless for electricity generation and on the other hand 140 kWh can be extracted.

The higher the potential of the heat an industry needs, the more difficult is it to find a heat source from which to provide it, and for almost all practical purposes coal is the one fuel, or an alternative such as oil, which must be used. Some industries—mainly the metal industries—require heat at temperatures of 3,000 deg F or higher. At the other end of the scale there are many industries which require heat at 250–300 deg F. Both groups are very great heat consumers, between them using about 70 million tons of coal a year from the nation's 220 million tons at present produced. In between these two major heat requirements is electricity supply, which for efficient generation requires heat at about 1,000 deg F. Within a few years about the same quantity of coal, namely 70 million tons, will be used annually in the generation of electricity in central power stations.

Transfer Medium

Every heat requirement needs some medium through which the heat can be transferred from the fuel to the material to be heated. Usually the medium is air mixed with the fuel in gaseous form. It is obvious that the temperature of the heat transfer medium, i.e., the hot gases, must be higher than the temperature actually required for the work to be done. Such temperature requirements vary widely. For instance, to refine tungsten 6,300 deg F is needed, to refine iron or make cement 2,800 deg F is required, and to generate electricity 500/1,000 deg F is the necessary temperature. To cure plastics 350/450 deg F is needed, and the figures for making paper or heating an office or workroom are 250/300 and 140/180 deg F, respectively.

At one end of these requirements we have the need for high grade heat or heat at high potential, and at the other end for low grade heat only. It is inevitable that when high grade heat is to be supplied the heating medium retains a good deal of heat that cannot be used for the initial purpose, and if other low grade heat requirements are available use can then be made of the residual heat in the medium, i.e., in the hot gases, and, under these conditions, we have waste heat recovery.

Broadly speaking, industries which require very high grade heat require little or no low grade heat, and vice versa. Lying between these two limits are the heat levels necessary for the satisfactory generation of electricity. When residual heat in heating media is used for the generation of electricity, this is known as waste heat electricity generation. All modern iron and steel works make very full use of such waste heat to provide electricity to meet at least some of their power requirements. Another industry where waste heat can similarly be used is that of cement making.

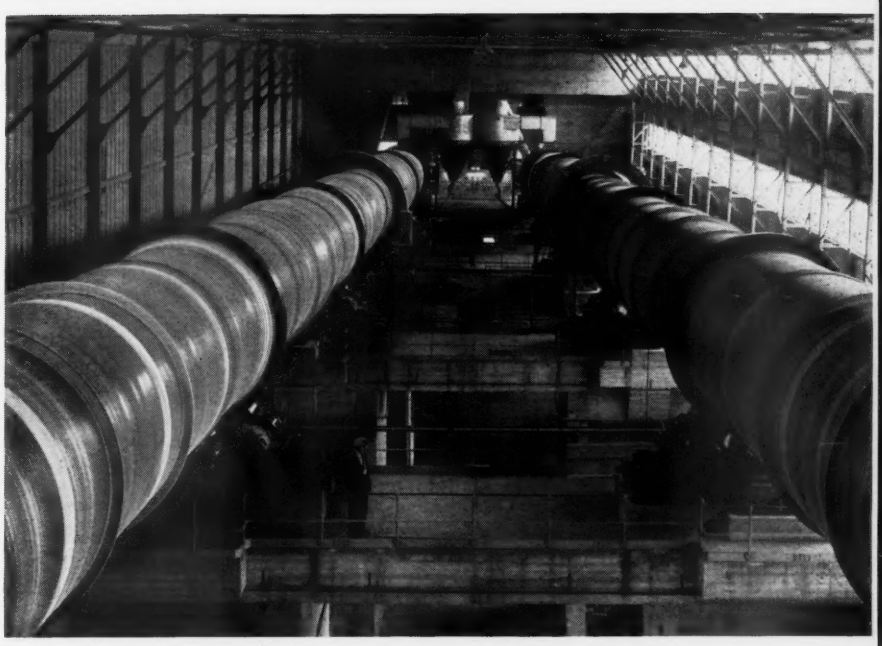
Additional Heat Method

A large number of low grade heat consumers have little or no waste heat after the completion of their industrial processes for the generation of electricity because, after the heating media have completed their work, the heat is of too low a potential to be of practicable use. Already it has been indicated that in order to generate electricity steam needs to have only a relatively small amount of heat added, but the heat must be at a sufficiently high potential. It is the fact that only a little heat needs to be added which gives the low grade heat industries the opportunity to generate electricity economically. If such industries raise their heating media to a higher potential, they can first be used for the generation of electricity, extracting only the small amount of extra heat added, and then be used at a somewhat lower potential for the necessary industrial processes. This form of electricity generation is variously referred to as private electricity generation, back pressure and pass out electricity generation, or combined heat-electricity generation. Combined generation is probably the best of these terms, but the same term could equally be applied to waste heat electricity generation and the distinction would not be made clear. In this article it is therefore suggested that the term "additional heat" electricity generation should be used for this purpose.

Electricity is becoming increasingly necessary to maintain the way of life for which people are striving, and every opportunity needs to be taken for generating electricity economically if we are to avoid the restrictions that might fall upon us if fuel requirements for electricity generation exceed the amount of fuel available.

It is well known that the normal process of electricity generation in central power stations is inefficient because so much of the heat originally extracted from the fuel and present in the steam is rejected at the condensers of the turbines and dissipated to rivers, the atmosphere, or

* Jas. Williamson & Son, Ltd.



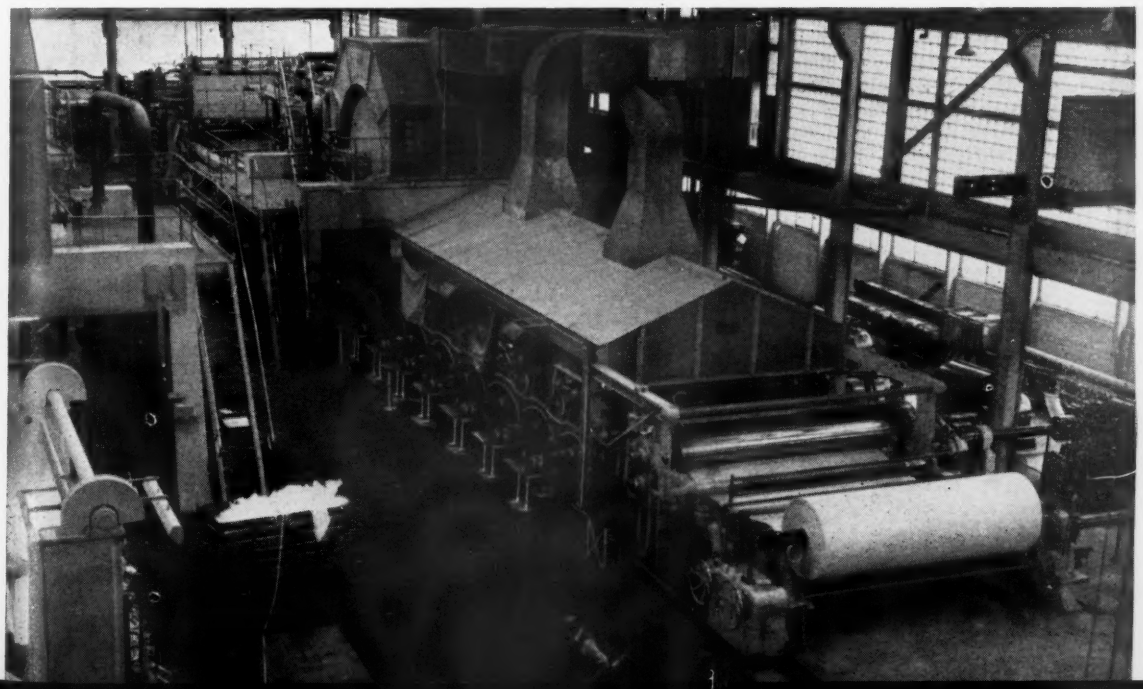
A cement kiln operates at a maximum temperature of about 2,500 deg F in the product

the sea. Very roughly, 80 per cent or more of the heat which is in the fuel is transferred to steam and about 30 parts of the 80 per cent are converted to electricity (in the most efficient stations) and the remaining 50 parts, i.e., 50 per cent of the heat in the fuel, is discarded at the condensers of the turbo-generator sets. That so much heat has to be wasted is a calamity, particularly when fuel is so scarce in this country. There are many indications that in ten to twenty years from now it will be extremely difficult, if not impossible, to mine all the coal that will be needed to meet expanding requirements. Atomic energy may, of course, be the solution.

It is of the utmost importance that every opportunity be taken for generating electricity with a minimum use of fuel wherever possible. Since we have two large groups of industry, respectively using high and low grade heat, many opportunities are presented for the generation of additional electricity at low fuel cost. The purpose of this article is now to outline two typical schemes which require the use of very little additional fuel for the purpose of generating electricity as a by-product. The first outline is of a waste heat electricity generating plant and the second of an additional heat electricity generating plant.

A cement kiln operates at a maximum temperature of about 2,500 deg F in the product which ultimately becomes cement and, for this high temperature, the combustion gases are at least at 2,800 deg F. As the gases pass from the hot zone of the kiln they are cooled by the incoming product and finally emerge at temperatures of the order of 1,000 deg F. The initial high grade heat has, therefore, become degraded by 1,800 to 1,000 deg F in performing the duty for which it was provided. A typical kiln might use 10,000 lb of coal per hour and 180,000 lb of air for combustion. We thus have this quantity of hot gas emerging, plus water evaporated from the ingoing cement slurry, making a total of something over 200,000 lb/hr of gas, at a temperature of 1,000 deg F. Of the original energy in the fuel, approximately one half has been used and the balance remains in the exhaust gases. Part of the exhaust heat is latent, i.e., has been used for evaporating water from the slurry, and part, about 30 per cent of the original, is sensible heat. This latter part is of use to us, if we take

Heat is used in paper making mainly for drying the wet paper sheet



the trouble of transferring it to water and steam, and it can be used for generating some electricity.

The hot gases of combustion can be safely reduced in temperature to about 450 deg F. Below this temperature there is increasing risk of serious corrosion due to the SO_2 and SO_3 content of the gases. Using a waste heat boiler and economizer to extract the heat, and attaining the temperature drop mentioned, some 28 million B.Th.U. per hour can be extracted. Let us suppose the boiler is designed to operate at 160 lb/sq in (500 deg F). With a transfer efficiency of 75 per cent, 17,000 lb/hr of steam would be generated. This quantity of steam, at the temperature and pressure stated, will generate about 1,200 kW when taken down to a vacuum of 28½in (90 deg F).

The exhaust gases, by reference to normal temperature, contained about 47 million B.Th.U./hr, or sensible heat amounting to about 37 per cent of the heat in the coal fed to the kiln. About three-fifths of this was arrested at the boiler and a little less than half of it transferred to the steam, actually 20·5 million B.Th.U./hr. From this heat quantity in the steam, 1,200 kW was generated, the equivalent of 4·1 million B.Th.U./hr.

The original 10,000 lb of fuel per hour fed to the kiln contained 125 million B.Th.U. and it seems hardly worth while going to the trouble of installing waste heat boilers and turbo-generators to claim only 4·1 million B.Th.U. of it. Further, the energy finally reclaimed as electricity is small, particularly because of the inefficient process of generating electricity in the turbo-generators. The electricity so generated, however, has saved a like amount from generation elsewhere (in central power stations) involving the same inefficient process, and the coal that would have been needed in central power stations would have been 1,500 lb/hr. We now have a more realistic view of the saving, namely 1,500 out of 10,000 lb of coal, or 15 per cent. If waste heat electricity generation were applied throughout the cement industry in Britain, about 300,000 tons of coal a year, otherwise needed in central power stations for the generation of electricity, would be saved.

Paper Mill Installation

Heat is used in paper making mainly for drying the wet paper sheet after it has been formed and pressed. For this purpose steam is the heating medium and a pressure of 30 lb/sq in is commonly used. In all such heating operations it is the latent heat in the steam which is of value and the temperature only needs to be sufficiently high to give rapid evaporation of the water in the sheet. Superheat in the steam is a disadvantage and so, in any prior use to which the steam is put, its temperature may be reduced to the dry saturated value for the pressure adopted.

A large paper mill producing 16 tons of paper per hour, or about 2,600 tons per week, would require about 90,000 lb/hr of steam for the drying cylinders of the paper machines. The heat content of such steam would be 1,180 B.Th.U./lb and assuming the boiler feed temperature as 160 deg F, 1,020 B.Th.U. of heat per lb of steam would need to be added at the boilers. For the quantity of 90,000 lb/hr of steam, with coal at 12,500 B.Th.U./lb, 10,000 lb/hr of fuel would be consumed. For generating steam at such low pressure, probably shell type boilers would be used and, in calculating the fuel consumption, an efficiency of 73 per cent has been taken, which is quite good for such plant.

In order to generate electricity for use in the paper mill, the steam would need to be raised to some higher temperature and pressure. Then, by passing it through a turbo-generator, work would be done for the purpose required. The value of the higher pressure and temperature would depend on the quantity of electricity needed and here there is quite wide scope. For instance, an initial pressure of 100 lb/sq in (440 deg F) would enable 1,500 kW to be generated, and for greater quantities of power, such as 3,000 kW or 4,500 kW, 260 lb/sq in (580 deg F) or 525 lb/sq in (725 deg F) would be needed at the boilers. Shell type boilers could still be used for the lower of these pressures, but for 525 lb/sq in water tube boilers would be required.

How much more heat, and consequently fuel, would be needed for the quantities of power just mentioned? The answers are 6·9 per cent for 1,500 kW, 12·8 per cent for 3,000 kW and 18·8 per cent for 4,500 kW. An improvement in boiler efficiencies would, of course, reduce the extra fuel required and, particularly with a change-over to water tube boilers, better efficiencies than 73 per cent would readily be available. In the 4,500 kW plant, with boilers working at 80 per cent efficiency, the extra fuel would be reduced from 18·8 per cent to only 9·5 per cent, i.e., there would be a total hourly consumption for the paper mill of 10,950 lb as against 10,000 lb in shell boilers working at 73 per cent and providing heating steam only. It is thus seen that with extra heat electricity generation we have a most economical fuel proposition. The 4,500 kW generated with an extra fuel consumption of 1,880 lb/hr with 73 per cent efficiency boilers, or 950 lb with 80 per cent efficiency boilers, would have needed 5,600 lb/hr of fuel in a central power station. This same rate of saving applied to the whole paper making industry, which uses about 700,000 tons of coal per annum, would reduce fuel consumption in central power stations by 390,000 tons per annum. Taking into account the extra 18·8 per cent fuel used in paper mills (for 73 per cent efficiency boilers) or 9·5 per cent (for 80 per cent efficiency boilers), the national fuel saving would be respectively 260,000 or 325,000 tons per annum. In fact paper mills do generate a large proportion of their electricity requirements and these savings are already being achieved to a considerable extent.

To sum up, with waste heat electricity generation we use no extra fuel and from residual heat generate electricity by the rather inefficient condensing turbo-generator. With additional heat electricity generation we use a little extra fuel and generate electricity by means of efficient back-pressure turbo-generators. Throughout it has been assumed that turbo-generators have been straight condensing or back-pressure. In practice pass-out condensing turbines are frequently used in order to be able to regulate the quantity of electricity generated relative to the heat requirements of the factories, but the extent to which the condenser is used makes the operation decreasingly efficient.

Midlands Electronics Exhibition

THE Scientific Instrument Manufacturers' Association is to hold an exhibition of electronic aids to production, design, and research, under the title " Electronics at Work," in the Chamber of Commerce Hall, Birmingham, from 23rd to 25th November. Admission is by ticket obtainable free from the Association at 20, Queen Anne Street, London, W.1, or from the Birmingham Chamber of Commerce, the Birmingham Exchange and Engineering Centre, or the City of Birmingham Information Department. The exhibition will include a large number of working demonstrations showing the employment of electronics in a wide range of industrial applications, in public services, medicine, and education, and in varied spheres of research and development.

Recruitment to Engineering

Discussion at British Association Meeting

AT the recent Oxford meeting of the British Association for the Advancement of Science, a joint meeting of Sections L and G, which was presided over by Mr. Ronald Gould, discussed the subject of recruitment to the engineering profession.

Dr. Willis Jackson, F.R.S., who opened the series of three addresses, said that the productive achievements of the engineering industry dominated the entire British economy and it was impossible to visualize a satisfactory future for ourselves except in relation to a healthy, vigorous and creative condition of this industry. Yet, in spite of all that had been done, the recruitment to it was falling short of requirements in both quantity and quality. The situation was causing serious concern. The courses of technical education and practical training for engineering technicians were perhaps the least satisfactory of those available to engineering personnel, which was because their status was not nearly so well defined nor the importance of their systematic education and training so fully appreciated as in the case of professional engineers and craftsmen.

More deliberately organized courses of practical training and of technical study were needed for this important grade of personnel and the Institution of Electrical Engineers had given a lead by seeking a clearer formulation of the problems to be solved.

The engineering factory was a highly educative environment. Whether he was a graduate, student or craft apprentice, the young man was brought into intimate association with men of great and varied skill, of all ages and shades of opinion, and having considerable experience of life in general. Nevertheless, in the absence of organized arrangements for the initiation of the newcomer and for a maintained contact with him by apprentice supervisors throughout his training, the transition from school or university life could be severe. Referring to the need to attract more of our most able schoolboys to a professional career in engineering, Dr. Jackson pointed out that the number of acceptable applicants for entry to degree courses in engineering was not keeping pace with post-war university and college expansion; some 300 first-year university places were unfilled during last session, while a disturbingly large proportion of those accepted failed to pass the first year examination this summer.

Headmasters' Quandary

Mr. Donald Lindsay, headmaster of Malvern College, asked if it was the business of the independent and maintained grammar schools to produce engineers or, indeed, to produce members of any particular profession and calling. No doubt recruitment to all these professions was a matter of national concern, but what was the poor headmaster to do about it? In the old days, the aim of a school was to turn out an educated man and the school was not primarily concerned with vocational education in the narrower meaning of that term.

Mr. H. A. Warren, principal of the S.E. London Technical College, said that a remedy must be found and applied, not only in technical education, but in the philosophy and outlook of the age which would again restore the powerful "means" of technology to the service of the liberal "ends" of human life and human character. If such a change could soon be made it would go far not only to infuse the professional technical qualification with some of the liberal values originally associated with a university degree, and thus maintain the quality of entrant to the engineering profession, but it would also engender that breadth of outlook and height of aspiration in our way of life which alone could preserve our technical civilization from the real and sordid dangers of materialism.

Mr. A. E. Evans, formerly secretary of the Association of Teachers in Technical Institutes, in opening the discussion, pointed out that while Dr. Jackson thought that engineering education by itself was capable of giving cultural values, Mr. Warren apparently did not agree. If there were a shortage of people about to enter engineering, then to insist on subjects with a quasi-cultural value was not likely to solve it.

Mr. Kenneth R. Evans (Metropolitan-Vickers) spoke of the great change in the attitude of industry towards applying to headmasters for information about boys. In the course of a year he received about 600 or 700 replies from headmasters, who gave complete co-operation. The school certificate used to be helpful in giving some idea of a boy's training but it had been replaced by something better—the co-operation of the headmasters, who gave information which in the past had not been sought. No doubt headmasters were developing sales resistance to the propaganda which reached them from the various professions!

Professional Engineers and Technicians

Referring to Dr. Willis Jackson's concern about the dearth of professional engineers, he said that part of the trouble was due to the fact that in some places professional engineers were employed on work which could be done by technicians. The industry, in seeking professional engineers, was in competition with the scientific Civil Service, other Ministries, the nationalized industries and the Services. One of the most serious aspects was the failure to use to the utmost those with some technical knowledge so that they could relieve the professional engineer of some of his work.

Dr. B. E. Lawrence, education officer, Essex, suggested that engineering was unlikely to get a much higher proportion of grammar school leavers at the university level than at the moment. There were so many claims on boys reaching the sixth form that the chance of any profession getting a larger proportion in the next few years was very small. All professions would benefit a great deal if local education authorities could stop the loss which took place from grammar schools between the ages of 15 and 18, for although many of the premature leavers would not benefit by another two years at the grammar school, perhaps 50 per cent of those leaving prematurely would be first-rate material for the professions if they stayed on.

Mr. Alec Rodger, an industrial psychologist, said that during the war the Admiralty had used quality control. When the situation regarding radio mechanics and electrical mechanics became acute, for example, the branches were told, "You can have no more of these high-grade people and you will have to adopt alternative procedures. You must improve your training courses, have some slower courses for less able people, reorganize your allocation of

jobs, standardize your sets, provide better fault-finding charts." Such lessons would have to be learned by industry.

Dr. H. A. Cole said it was often impossible for a boy to get teaching of sufficient quality in science subjects, so that if we were looking for first-rate boys we should not confine the search to boys qualified in science. If we could find a boy with a genuine interest in machines we could probably make him into a satisfactory engineer.

Mr. S. Price considered that although it might be awkward for headmasters to receive brochures from a large number of individual firms of high repute dealing with their schemes of training, it might be an advantage if some national organizations, such as the engineering employers or the F.B.I., could run a register of engineering undertakings, particularly those which provided training for sixth form boys from the grammar schools.

Professor A. F. Burstall, King's College, Newcastle-on-Tyne, said that many of the most intelligent people in the community were women; why not try to get them into engineering? There were many jobs in engineering for which women could be employed most usefully. The F.B.I. should circularize headmistresses as well as headmasters.

Mr. Hall observed that the entrance requirements of the universities for engineering courses were such that it was impossible for the able student of classics or modern languages to become an engineer if he changed his mind in his second year at school. The introduction of an intermediate year, as suggested by Dr. Jackson, might help with this problem.

Cross-Channel Cable

Problems to be faced in laying a cable on the bed of the English Channel to connect the British 132 kV grid to the corresponding h.v. system in France were surveyed by Mr. F. J. Lane, deputy chief engineer (transmission), British Electricity Authority. The French high-voltage system, he said, which was interconnected with seven other systems, dealt with a maximum demand in 1952–53 of 7,600 MW; of the installed capacity of 13,800 MW, 55 per cent was hydro-electric. Corresponding particulars for the British 132 kV system were 14,900 and 17,000 MW, of which 99 per cent was thermal. If Britain were split into three not interconnected groups, 11 per cent more generating plant would be required—in itself a justification for the new 275 kV system.

The French annual load factor of 61 per cent compared with the British 45 per cent and the variation between summer and winter demands in France was much less than it was here. Differences in climate, local weather conditions, clock times, hours of work and industrial, commercial and domestic uses of electricity resulted in differences between maximum demand periods. The result was that the winter diversity between the highest simultaneous demand and the aggregate of the highest individual demands of the two systems ranged from 600 to 400 MW, so that the 300 MW taken as a basis could be regarded as conservative.

The estimated capital expenditure of £4·3 million on a 100 MW connection would be offset by a reduction of £10 million in the cost of generating plant. Also savings in operating expenses due to transfer of energy at times when costs of production were more favourable in one country than in the other might approach £600,000 per annum.

Hazards were: severe mechanical stresses in lowering a cable to the sea bed and in repairing it on an unsteady deck; damage by anchors and fishing gear; abrasion against rocks; and corrosion by salt water. The need to minimize the number of joints or, preferably, to manufacture the cable in one complete length was dictated by the impracticability of keeping a ship in one position for 48 hours or more while jointing. This reason determined the selection for the Dover sea trials of a pre-impregnated gas-pressure cable (filled with nitrogen at 200 lb/sq in), which had its paper insulation dried, impregnated and cut before application and hence was not limited as to length by the size of impregnation tanks; a continuous lead sheath was also a possibility.

For the French side of the Straits the choice was a gas-compression cable, insulated and impregnated as a normal solid cable but with slightly oval conductor and lead sheath, between which and an outer circular sheath the gas under pressure was introduced; the use of impregnation tanks limited the length of this cable.

The stranded copper conductor had an area of 0·5 sq in for mechanical reasons and thus could transmit nearly 200 MVA. Four single conductors (one per phase and one spare) would be laid 1,000 yd apart to facilitate grappling. Sheath and armouring losses with galvanized steel wire armouring would be 170 per cent of the copper loss, but with aluminium alloy these losses would be only 60 per cent and would offer not much less resistance to corrosion. Galvanized steel was preferred, however, because its abrasion resistance in water was about six times that of aluminium alloy and overall costs were lower.

After references to investigations being carried out in France and to experience gained in the sea trials, including the method of laying, the author considered the possibilities of a d.c. connection as now in operation for transmitting 10 MVA at 100 kV between Sweden and Gotland Island, 60 miles away.

Disadvantages of a.c. as compared with d.c. were: the cable charging current (50 to 70 MVA at 132 kV) might need reactive compensation to minimize voltage variations and switching difficulties; sheath and armour and dielectric losses; parallel operation of the two systems would call for very close control of frequency. It had been estimated that a cable designed for 76 kV a.c. to earth (132 kV between phases) could be operated at 200 kV d.c. to earth, increasing its carrying capacity 2½ times.

Considerable research, however, would be required on the electrical and thermal characteristics of high voltage d.c. cables and on the terminal equipment for rectification of a.c. and inversion of d.c. The Electrical Research Association had estimated that a development period of eight years at a cost of £1·3 million would be necessary, whereas service applications would probably be few in Britain itself. While the early provision of a d.c. cross-Channel circuit seemed improbable, the fourth (spare) cable envisaged might be made available for experimental d.c. transmission in the meantime.

Engineering Exports

Mr. Bosworth Monck (Spicers, Ltd.) submitted in a paper presented before the Engineering Section that the spectacular increase in the output of the British engineering industry, which was part of the expansion of world trade in manufactured goods, had tended to obscure the progressive decline in its share of world trade in the last 50 years. One cause of the decline might well be that the professional engineer had less control over the destinies of the industry.

Up to 1937 Great Britain had the largest share in world trade in manufactured goods as a whole, although by 1913 Germany had surpassed us in engineering products and, by 1929, the United States had done so as well. Between

1950 and 1952, in engineering products, Britain had lost ground to Germany, Belgium and Canada, whilst the United States had retained her share. In 1952 the British engineering industry accounted for nearly half this country's imports. Thus, unless it could again lead the world in technical standards and commercial adroitness, any check to the expansion of world trade would drastically cut our standard of life.

An analysis of the 725 public companies comprising about four-fifths of our engineering output revealed that over two-thirds of the directors had no professional qualifications, while two-fifths of the boards (representing about a quarter of the capital investment), had no technically qualified director. In 1902, 67·5 per cent of the Council of the Institution of Mechanical Engineers held directorships, as against 29·5 per cent in 1952.

In the last 50 years the proportion of chartered engineers to working population had increased fourfold, which was higher than in the United States and Switzerland, though less than in Sweden.

Yield Point in Steel

In an Engineering Section paper on "The Yield Point in Steel" Mr. G. Murray said that this caused serious trouble in the manufacture of highly finished pressings owing to the severe surface markings which accompanied the sudden yield of the metal at the beginning of plastic flow. Improvements in production methods for sheet steel had resulted in softer and more finely grained sheets, which gave superior ductility, but increased the severity of the extension at the yield point and so produced more severe "stretcher strain" markings.

Roller levelling methods which adequately suppressed the yield point in the coarser grained material previously used were inadequate now, and most sheet had to be used after light cold rolling, which, although effective in removing the yield point, gave rise to strain-age hardening which seriously reduced the ductility.

Until recently little was known of the physical cause of the yield point, but recent research at the universities had provided a working theory explaining it as the anchoring of crystal lattice dislocations by clouds of dissolved carbon or nitrogen atoms. Other work had demonstrated that the presence of internal stress through the thickness of a sheet of steel could prevent the formation of stretcher strains. With that basic knowledge as a starting point it was hoped that methods would be worked out for more satisfactorily suppressing the yield point, which might well be the development of improved roller levelling techniques to enable sheet in the soft annealed condition to be treated so as to suppress the yield point without the disadvantages of the light cold rolling operation.

Thermal Reactors

In considering the nuclear physics of thermal reactors Mr. P. A. Egelstaff said that the central problem now was the attainment and maintenance of a reproduction factor greater than one, i.e., for every neutron absorbed in the reactor at least one must be generated. With natural uranium reactors this was only just possible, which entailed using the available neutrons very carefully.

A natural uranium reactor could run for long periods without failing, because, first, there was just enough of the isotope uranium 235 present for the reactor to start up and, secondly, the nuclear properties of uranium 238 were such that a large part of the uranium 235 used up was replaced by plutonium 239, which was equally satisfactory as a nuclear fuel.

Because of the permanent austerity in the neutron economy the nuclear physicist was always studying ways of saving a few neutrons or of generating a few more. He wished to know why the reactivity of the reactor changed with temperature, and why it changed in a certain way with time. In addition he would like to be able to predict reactivity changes in new types of reactor.

The complete answer to these questions would not come for many years, but a great deal of information was being collected each year. As an example of the type of information needed there was the absorption of neutrons by the fission products. After the uranium nucleus had undergone fission, two other nuclei were formed from it. If these fission products absorbed neutrons strongly they might "poison" the reactor. This was illustrated by the problem of how the fission product, samarium 149, affected the reactor.

Magnetization in Rocks

Reversed permanent magnetization in rocks provided the theme of a Physics Section paper by Dr. G. D. Nicholls (University of Manchester). Many rocks had, he said, a natural permanent magnetization of measurable intensity and direction. This magnetization was acquired during their formation; its direction (magnetic polarization) should be related to the direction of the earth's magnetic field at that time. The magnetic polarizations were often sufficiently stable to be used as data on the orientation of the earth's magnetic field in earlier geological times.

Polarizations were not always parallel to the present-day geomagnetic field and orientations varying from N 70 deg W to N 40 deg E had been reported for rocks formed in distant geological periods. In addition there were polarizations about 180 deg different in declination and inclination from those of rocks formed in the same area at slightly earlier or later dates. Reversed polarizations had been reported in rocks as old as pre-Cambrian and as recent as late Quaternary, barely a million years ago. Their existence posed the fundamental question of whether they indicated reversals of the geomagnetic field periodically throughout geological time or whether certain rocks had the property of developing a magnetic polarization reversed with respect to the geomagnetic field operating during their formation.

Certain exceptional rocks, after having been demagnetized and then made to re-develop their magnetization in the laboratory, acquired a polarization reversed to the field applied during the investigation. This behaviour was "abnormal." Most rocks which showed a reversed polarization when first examined acquired in the laboratory a polarization parallel to the applied field—behaviour which is called "normal." It suggested that when these rocks were formed the earth's field must have been reversed, but possibly changes affecting the rock subsequently might have modified the way in which it could acquire magnetization, so that its behaviour in the laboratory did not reproduce its behaviour when it first developed a permanent magnetization.

Few rocks possessed the potentialities for "abnormal" behaviour. The changes necessary to make such a rock behave normally in the laboratory could be predicted and the consequences on its magnetic properties deduced. Laboratory evidence did not show that such changes had occurred. It was concluded that in most cases of reversed permanent magnetization the earth's magnetic field was reversed at the time of rock formation. Present evidence favoured the view that repeated reversals of the earth's magnetic field had occurred, and that approximately a million years ago the north-seeking pole of a compass needle would have pointed to Antarctica.

Public Lighting Conference

Report of Last Week's Proceedings at Eastbourne

Mr. J. M. Waldram (vice-president, A.P.L.E.), Councillor L. W. Pyle (Mayor of Eastbourne) and Mr. L. A. Doxey (president, 1954–55)

THE proceedings at last week's annual conference of the Association of Public Lighting Engineers at Eastbourne opened with the annual general meeting. After welcoming the delegates Mr. C. C. Smith, the retiring president, paid a tribute to Mr. A. S. Tapsfield, who has had to retire from the position of editor of transactions and from the council owing to ill-health, and announced the officers for 1954–55: President, Mr. L. A. Doxey; vice-president, Mr. J. M. Waldram; honorary editor of transactions, Mr. E. C. Lennox; and honorary treasurer, Mr. H. C. Brown. Mr. Granville Berry (Coventry) was elected to the vacant seat on the council.

After his induction as president, Mr. Doxey introduced the new vice-president, Mr. Waldram, chief research engineer of the G.E.C. Research Laboratories. The latter expressed his appreciation of the honour of being the first vice-president who was not a lighting engineer, and also referred to another distinction conferred on an A.P.L.E. member, the election of Mr. Lennox as president of the Illuminating Engineering Society.

Extending an official welcome on behalf of the town of Eastbourne, the Mayor, Councillor L. W. Pyle, J.P., said that Eastbourne prided itself on being one of the best lighted towns in the South of England. Lighting, he said, made life happier, prevented accidents and crime, and helped to increase business. Later, in the company of the president and vice-president, the Mayor inspected the exhibition of street lighting apparatus and equipment and outdoor displays of lamp columns and mobile equipment.

Before giving his presidential address (reported in our last week's issue) Mr. Doxey opened the Tuesday afternoon session with a welcome to overseas delegates from Singapore, Bombay, France, Holland and Belgium. Proposing a vote of thanks to the president, Mr. Waldram emphasized that street lighting was not, on its own, a cure for road accidents, but must be co-ordinated with other things. It was a combined effort and must be carried out in co-operation with the road engineer, the town planning authority, parks and gardens committee, the local authority treasurer and the research engineer. Seconding the vote of thanks, Mr. J. R. Brodie (Ayr) appealed to the three areas not already covered by the five regional sections of the Association to complete the programme.

The discussion of the paper by Mr. W. Robinson (E.D.A.) on "Street Lighting and Road Safety" was opened by Mr. Lennox. He deplored the general increase in accidents at night and said statistics showed that the road user suffered from lack of lighting. Scientists had produced excellent fittings but now the matter was out of their hands. Could not more money be diverted to public lighting? There was a difficulty in getting money into the hands of the administrators of public lighting and there was something wrong with the financial structure of a system which imposed such high lighting rates on small local authorities.

Mr. R. Bell (L.E.B.) made a plea for better roads, properly lighted and, in the meantime better lighting on existing roads. Mr. F. H. Pulvermacher (South Wales E.B.) declared that we could not afford *not* to light roads: money spent on street lighting would be less than the cost of accidents. Mr. L. R. Osgood (Luton) pointed out that most accidents in his town took place at traffic lights and he thought that the real problem was the elimination of the bad drivers. Mr. E. A. Slight (Wallasey) suggested that the Government should initiate the perfectly lighted town so that its effects could be studied.

Replying to points raised in the discussion, Mr. Robinson said that the change in the traffic code involving the use of headlights in built-up areas was important and he hoped it would result in an alteration of the attitude towards street lighting. He thought that the problem of dusk was overstated. The results shown by a perfectly lighted town would, he considered, be conclusive.

In proposing a vote of thanks to Mr. Robinson, Mr. N. Axford (South Western E.B.) said that if a single life was saved as a result of the paper, it would have been worth while. He made a plea for lighting authorities not to be cheese-paring with regard to lighting-up times.

At the Association's annual luncheon on Wednesday the toast of "The County Borough of Eastbourne and the Guests," was proposed by Mr. N. Boydell (South Eastern E.B.), who for nine years was borough electrical engineer of Eastbourne. In reply, the Mayor suggested that no other country in the world was so well lighted and said that this was due largely to its lighting engineers.

Proposing the toast of "The Association," Sir Roger Duncalfe, president of the British Standards Institution, said that the high repute in which the country's street lighting was held abroad owed much to the efforts of the A.P.L.E. and the B.S.I. The lighting engineer was fortunate in his choice of profession; it was stimulating to bring light to mankind and to play a part in the removal of dangers of the dark. Sir Roger then reviewed the progress of lighting in his lifetime. Good lighting was not a luxury but a vital necessity and despite the striking progress there was still room for improved technique and research and the better standards which research made possible. The problems of type and quality of installation

to be used required much thought and the value of standards was most pronounced in matters of safety. The Association, he said, was inspired by the same aims as the B.S.I. and had proved a vital link in co-operation with other bodies. The president briefly replied.

Dr. H. H. Ballin (Thorn) opened Thursday's discussion on the paper on " Some Unusual Uses of Fluorescent Tubes in Street Lighting " presented by Mr. B. C. Ossitt (S.E.E.B.). Dr. Ballin wondered how far the new and unusual systems of lighting proved existing installations wrong. Two features of lighting were now being appreciated more: glare and the fact that in busy centres, owing to the traffic, there was not much road to illuminate. The fluorescent tube had great advantages but it was bulky and needed a heavy type of column. The unusual installations were designed to overcome these difficulties. Vertical installations did not bring any new problems and were very desirable if one was prepared to sacrifice a little efficiency. Wall mounting of the tubes made use of the reflection from the walls of the buildings as well as the road, though a certain amount of light was wasted. Owing to the absence of glare a feeling of comfort was produced, but there might be a disadvantage as a result of the loss of a sharp silhouette. Certain troubles arose owing to the inability to control building surfaces.

Mr. A. W. Christie (Road Research Laboratory) thought that if lanterns were relegated to the sides of the streets there might be a darkening of the centre of the road. This difficulty could be overcome by using light coloured road materials. Horizontal wall lights might provide a means of lighting very rough road surfaces in cities.

Mr. E. H. Jesty (L.E.B.) considered that the mounting of the fittings over 20ft high would be an advantage because of the reduction in glare and of malicious damage.

Mr. L. Gaymard (Paris) said that in France the inclining of the tubes at angles between 15 and 50 degrees was favoured. The mounting of fluorescent tubes on buildings offered a solution for lighting picturesque villages. For lanterns installed parallel with the road it was found better to use no reflectors and have less spacing than with transverse lanterns.

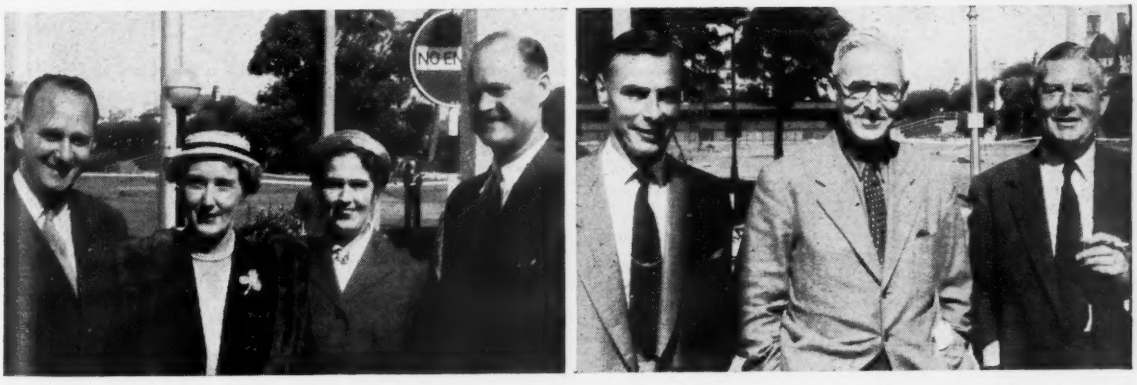
Mr. J. M. Waldram said that as the unusual systems of lighting referred to were less efficient it was necessary to make up for the deficiency by increasing the power of the lanterns and reducing the spacing.

Mr. G. H. Fowler (L.E.B.) said that while the City Corporation had compulsory powers for obtaining wayleaves for mounting street lighting fittings on buildings, it had never had to use them; in fact the æsthetic qualities of the lamps had made architects ask for them to be affixed to buildings. The reflection of lighting from opposite walls was not a part of the scheme.

Mr. C. C. Smith (Liverpool) thought we might be falling between two stools in adopting the new methods, encroaching on the direct illumination of the object and decreasing the effect of silhouette vision. An installation might appear good but its revealing power might be low. He commented on the variation in spacing and concluded with a plea for tolerance in the matter of æsthetic tastes.

Pointing out that the applications of the suggested fluorescent systems were limited, Mr. R. Parker (Aberdeen) declared that to get a satisfactory lighting system all the

Left : Messrs. B. L. Wells (L.E.B.) and G. V. Harrap (S.E.E.B.). Centre : Messrs. E. Evans (secretary, A.P.L.E.) and C. C. Smith (president, 1953–54). Right : Messrs. E. H. Skinner and H. Pryce-Jones (S.E.E.B.)



Left : Mr. and Mrs. H. Carpenter (Blackpool), Mrs. N. Boydell (Eastbourne) and Mr. E. B. Sawyer (E.L.M.A.). Right : Messrs. L. H. White (Revo), A. W. Poynor (Beddington & Wallington) and P. C. Wardle (Revo)

time it was necessary to have a lot of lighting owing to competition with other sources of light. Spacing must be elastic and a maximum fixed.

Dr. R. C. G. Williams (Philips) made a plea for consideration of people living in the streets affected and said that a wall design of lantern could overcome inconvenience. Dr. J. W. T. Walsh queried the advantages of wall mounting over centrally suspended cut-off lanterns.

Replying, Mr. Ossitt said that modern fluorescent lighting equipment was tending to become less bulky. They must aim at getting at least 4,000 lumens per 100ft of road. He did not think there was much future for wall mounted fittings in residential areas.

A vote of thanks to Mr. Ossitt was proposed by Mr. H. Carpenter (Blackpool).

"Compromise" Suggested

The theme of the first paper on Thursday afternoon was that much could be done at reasonable capital outlay to improve inefficient street lighting installations and bring them up to recommended standards. The author was Mr. A. V. Horsfall (West Midlands Gas Board), who took as the title of his paper "Further Details on a Wise Compromise in Street Lighting."

Mr. J. Wilson (Paisley) deplored the inclusion of a paper advocating the continuation of gas lighting. He thought the capital costs given in the paper for electrical installations were 50 per cent too high and he pointed out that as the running cost of gas was two or three times that of electricity the suggested compromise was a very costly one. Mr. E. H. Jesty (L.E.B.) and Mr. J. B. S. Smyth (G.E.C.) also emphasized the importance of taking running costs into consideration, as did also Mr. J. T. Kilner (Prestwich) who instanced savings in running costs of £6 10s and £20 per year per lamp in Class B and Class A streets in his area. Mr. E. Stroud (Concrete Utilities) thought it was wrong to consider the compromise as a long term policy. Mr. F. C. Smith (N. Thames Gas Board), who proposed a vote of thanks to the author, said they must not lose sight of the safety factor and the risks involved by leaving an installation in service too long.

Street Lighting Control

"The Control of Electric Street Lamps" was the topic of the paper which followed, presented by Mr. A. J. Ogle (N.E.E.B.). The discussion was opened by Mr. A. E. Morgan (L.E.B.), who emphasized the savings effected by eliminating hand control. After pointing out the advantages of the synchronous type of switch he agreed that group control was the cheapest method but suggested that above 3,000 lamps the a.c. injection system was an economic proposition. Mr. Eric Bates (E.E.B.) thought that the figure of 8s given for the cost of a synchronous motor driven time switch should be doubled. Mr. H. Lloyd-Williams (L.E.B.) mentioned the disadvantage of the injection system in highly built-up areas when the increased demand for electricity made a new substation necessary.

Promising results of experiments in the control of street lighting by radio were mentioned by Mr. W. H. Shaw (Coventry), who said that a single transmitter costing less than a tenth the amount of a ripple control system could control the lighting in a 2 sq mile area with two valve receivers for every group of lamps. Official permission was not forthcoming to use this system, however, and he suggested that two or three frequencies should be allocated to local authorities for street lighting control purposes. Mr. H. F. Cork (Manchester) thanked Mr. Ogle for his paper.

The subject of Friday's paper, "Research on Two Aspects of Street Lighting: Accident Statistics and Road Surface Characteristics," given by Messrs. A. J. Harris and A. W. Christie (Road Research Laboratory, Department of Scientific and Industrial Research), to some extent covered much of the same ground as that of Mr. W. Robinson. After discussing the effects of darkness, moonlight and summer time, the authors reviewed the evidence on the effect of street lighting. Some direct evidence was now being accumulated, they stated, that differences in street lighting might have an appreciable effect on night-time accident rates, but it was accompanied by other evidence which suggested that very considerable changes could be made here and there without greatly affecting the situation. More evidence was needed before they could be sure of the extent to which modern lighting achieved the task of making the road at night as safe as possible. Valuable lessons might be learnt from new installations which apparently produced little or no improvement since it was there that the counteracting factors were likely to be operating most strongly. Regarding the part played by road surfaces there was need for a better understanding of how the twin requirements of skid resistance and light reflection could best be combined.

In the discussion on this paper Mr. Granville Berry (Coventry) pointed out that this was the first occasion on which the D.S.I.R. had stated that the reduction of road accidents was tied up with improved lighting. He contended that improved lighting was in fact the biggest factor in reducing road accidents and experience in the U.S.A. and Canada had confirmed this. A reduction of only 10 per cent in accidents would more than pay for the cost of all the lighting improvements required. In making comparisons it was necessary to take into consideration the traffic before and after improvements in lighting and also the district through which a road passed. Once it was well lighted it attracted other traffic. He suggested that if the difficulties of wet road surfaces were overcome the problem of different types of surface would be solved. In Holland horizontal crossbar fluorescent lights 600ft apart, supplementing the normal street lighting, had been used to eliminate dark patches.

Mr. S. J. Chamberlain (Traffic Department, New Scotland Yard) said that the police were confident that an overall reduction in street casualties would result from improved lighting. Good lighting of a main traffic artery tended to draw traffic into it and this might reduce congestion in other roads. He made a plea for improved lighting of roundabouts and for more co-ordination in planning lighting schemes, especially in the lighting of curves.

Mr. Waldram said that much criticism of roundabouts arose from poor lighting. He suggested that comparative figures obtained for a well lighted area between 4.30 and 6.30 p.m. might give a clue as to whether the best lighting was good enough. With regard to road surfaces skidding might be avoided at the cost of spoiling the lighting. Mr. Osgood claimed that bad drivers were responsible for most accidents and that these occurred where the lighting was best.

Mr. Robinson emphasized the importance of taking into consideration the number of types of accidents. The figure of 10 per cent decrease in the total number of accidents which the authors said was the most that could be expected by improved lighting represented a 25 per cent reduction in deaths and a 15–20 per cent reduction in serious injuries. Mr. C. C. Smith referred to glare and the advantages of cut-off fittings.

At the conclusion of the proceedings the president mentioned that next year's conference would be at Folkestone from 13th to 16th September.

VIEWS on the NEWS

By REFLECTOR

As my readers know, the Minister of Fuel and Power has appointed a committee, "to inquire into the organization and efficiency of the electricity supply industry in England and Wales in the light of its working under the Electricity Act of 1947." Evidence is being collected by this committee from all kinds of individuals and organizations, including Chambers of Commerce. Thus it is reported by the *Sussex Daily News* that the National Chamber has asked the Brighton and Hove Chamber of Commerce

> "to provide details into the inquiry into the waste and inefficiency of the nationalized electricity industry, particularly relating to charges for power, the quality of service and the effectiveness of Electricity Consultative Councils."

This paragraph is headed "Seeboard on Trial" and is a sad example of bias and condemnation before hearing, "organization and efficiency," it will be seen, becoming "waste and inefficiency."

* * *

Fighting a rearguard action at the Eastbourne Conference of the Association of Public Lighting Engineers, Mr. A. V. Horsfall, of the West Midlands Gas Board, admitted that there were too many antiquated gas street-lighting installations in this country. But, he said, they could be replaced at reasonable capital expenditure by modern gas systems which would give 25 per cent more light for the same cost for gas. It seems to be the view of most lighting authorities that when it comes to replacement of obsolete gas systems it is better to make a clean break and go over to electricity. By this means they not only secure better lighting but also the other advantages, e.g., ease of control, which electricity carries with it.

* * *

It came as rather a surprise to me on having a look at the A.P.L.E. Exhibition at Eastbourne to find that, while the mobile equipment all seemed to be appropriately equipped with two rear lights, there was a singular dearth of reflectors. In accordance with the new regulations which come into force on 1st October two of these, like the two rear lights, are obligatory on all new vehicles so there is not a lot of time left. I wonder, too, how many private car owners there are without the reflectors which they also must have by that date. Owners of vehicles already registered have not, by the way, to worry about having two rear lamps until October 1956.

* * *

Possibly I am unduly sensitive, but slight inaccuracies in the rendering of the names of well-known organizations irritate me to the point of fury. References to the *Institute* of Electrical Engineers, for instance, are particularly annoying to me, especially when, as is too frequently the case, they are actually made by members of the I.E.E. As another example I turn to an advertisement by a prominent boiler-making concern which appeared in *The Times* one day last week. In this mention was made of the programmes of power station development by the British *Electrical* Authority. I consider that this sort of thing is inexcusable.

* * *

There have recently been some strong strictures in daily newspapers upon the onerous, not to say usurious, terms imposed on the public under hire-purchase schemes. It is true that the man in the street is generally quite unaware of the enormous rate of interest he may be paying for this accommodation. It seems that most of the blame falls not upon the actual sellers of the goods, but upon the finance houses which appear to charge excessively for their services. I remember an attempt made some years ago by the contractor-retailers to avoid this by the setting-up of a financing organization of their own but I believe that the plan failed through lack of support. Of course it is extremely difficult for private electrical traders to compete in this direction with the nationalized electricity supply industry, which is able to obtain money on terms far more favourable than those available in the ordinary commercial way. Nevertheless, if the private retailers were able to obtain finance at more reasonable rates they could do far more hire-purchase business than is possible at present.

* * *

Studying the interesting report of the general manager of the Glasgow Corporation Transport Department (Mr. E. R. L. Fitzpayne) I noted an odd fact—that bus travellers appear to be more forgetful than users of other forms of public transport. Statistics show that last year one in every 9,800 of the 211 million bus passengers left behind some article of property. In the case of the 397 million tram passengers the proportion was one in 17,000 odd, while the trolley-bus users, numbering nearly 43 million, were even more careful (losses of property, one in 21,500). The 36½ million Underground travellers, however, had the best record of all, the proportion who lost articles being only one in 24,500. There is also a reminder that as recently as 1952–53 halfpenny fares were still operative in Glasgow. This is now a thing of the past, but last year the average fare charged per mile on the trams was only 0·986d for adults and 0·494d for juveniles, which I imagine must be among the lowest in the country—and the trams still show a profit.

* * *

An account appeared in the *Electrical Review* of 23rd September, 1904 (half a century ago) of the new plant installed at Londonderry. It comprised three Lancashire boilers and four generating sets (two 250 kW and two 100 kW) which were B.T.H. machines direct coupled to Allen engines. The specifications and plans for the plant were prepared jointly by Preece & Cardew, of Westminster, and Mr. R. V. Macrory, city electrical engineer. There are now only three city electrical engineers in the British Isles, I believe, and Mr. Macrory of Londonderry is still one of them.

PERSONAL AND SOCIAL

News of Men and Women of the Industry

The Minister of Fuel and Power has reconstituted and strengthened his Fuel Efficiency Advisory Committee by the appointment of the following three additional members:—**Mr. G. E. Foxwell,** D.Sc., F.Inst.P., F.Inst.F., M.Inst.Gas E., M.I.Chem.E.; **Mr. B. E. A. Vigers,** M.A.(Cantab.), A.M.I.C.E., M.I.Chem.E., M.Inst.F.; and **Mr. W. A. Macfarlane,** B.A., B.Sc., Ph.D. The terms of reference of the reconstituted Committee will be: "To advise the Minister of Fuel and Power on particular questions in the field of fuel efficiency which he may remit to them."

Mr. J. H. Davies, manager of the Banbury District, Midlands Electricity Board, is retiring shortly. His successor will be **Mr. H. Eagles,** B.Sc.(Eng.), A.M.I.E.E., at present commercial engineer, Mexborough District, Yorkshire Electricity Board. Mr. Eagles has held appointments as mains engineer at Aylesbury, with the Mid-Southern Utility Co., the West Cambrian Power Co., Wigan Corporation Electricity Department and the Mexborough, Aldwick-le-Street and Ashbourne Urban District Councils.

Mr. W. E. Jones, M.I.E.E., the newly appointed assistant secretary (education and technical) at the head office of the Association of Supervising Electrical Engineers, has had extensive experience in the electrical industry. From 1931 to 1946 he was borough electrical engineer and manager of the Basingstoke Corporation Electricity Department, and between the years 1946 and 1948 he was area officer (mains), London and Home Counties Joint Electricity Authority. From 1952 to early 1954 Mr. Jones was engaged on administrative and technical work as a member of the technical staff of the British Electrical and Allied Industries Research Association at Leatherhead and his last appointment was that of secretary to the Diesel Engine Users' Association.

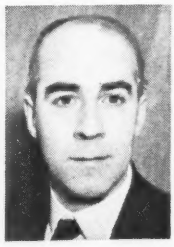
Mr. W. E. Jones

Mr. G. G. Buckingham, M.Inst.F., has been appointed manager of the Manchester office of Babcock & Wilcox, Ltd., in succession to the late Mr. F. W. Woodfield. Mr. Buckingham was educated at St. Albans School and after service with the Spearing Boiler Co. and the Buell Combustion Co. he joined the Stirling Boiler Co., Ltd., in 1929 in the drawing office, later transferring to the sales department and becoming chief assistant to Mr. S. J. Whybrow, the general manager. He was appointed to the Manchester office of Babcock & Wilcox, Ltd., in February of last year, following upon the absorption of the Stirling Boiler Co., Ltd.

Mr. C. H. Foulkes, M.I.E.E., has been appointed by Standard Telephones & Cables, Ltd., as head of the company's valve division and location manager at Dowlish Ford Mills, Ilminster, Somerset. This division is responsible for the development and manufacture of all of the company's special valves but does not include broadcast receiver valves. Mr. Foulkes joined the company in 1936 as a laboratory assistant, assembling cathode-ray tubes. In 1940 he was moved with the valve division to Ilminster, being engaged in the development of micro-wave tubes; he served on several Government committees for the co-ordination of valve development for the Armed Services. His work moved away from micro-wave tubes to cold cathode gas-filled tubes, repeater tubes, including underwater cable repeater tubes, and high power transmitting tubes. Early in 1954 Mr. Foulkes went to the United States to study for three months on the advanced management programme at the Business School at Harvard University. After completing the course he spent several weeks visiting electronic valve companies before returning to England to take up his present appointment.

Mr. C. H. Foulkes

Mr. C. F. Jackson, assistant general manager at the Willesden works of Lancashire Dynamo & Crypto, Ltd., has been appointed general manager of the works. Mr. Jackson, who received his technical education at Paddington Technical College, joined L.D.C. in 1941 having previously been works manager of Crypton Equipment, Ltd., an associated company. During the last war he conducted a series of lectures for business executives in production planning and industrial administration at technical colleges.



Mr. C. F. Jackson

Mr. J. B. Charters has succeeded **Mr. Marsden Ryle,** who recently retired, as manager of the Osram Glass Works at Wembley and Lemington. Mr. Charters began his career with the General Electric Co., Ltd., at the Osram Lamp Works, Hammersmith, and was assistant factory superintendent there when he joined the Wembley Glass Works in 1943 as factory superintendent. Later, in 1947, he was appointed production manager. The post of production manager left vacant by Mr. Charters has been filled by **Dr. F. S. Hawkins,** who before joining the staff of the Wembley Glass Works in February this year, was in charge of the Glass Department at the Research Laboratories of the company.

Sir Harold Roxbee Cox, B.Sc., Ph.D., D.I.C., M.I.Mech.E., has been elected a director of the Brush Group, Ltd. Until recently Sir Harold was chief scientist, Ministry of Fuel and Power.

Mr. R. McL. Fairfield, B.Sc.(Eng.), M.I.E.E., M.I.Mech.E., M.Amer.I.E.E., has been appointed director and general manager of British Insulated Callender's (Submarine Cables), Ltd., the new company recently formed by British Insulated Callender's Cables, Ltd., and W. T. Glover & Co., Ltd., to specialize in the manufacture of submarine power cables. Mr. Fairfield was a director member of the projects engineering panel of the B.I.C.C. group which carried out on behalf of the B.E.A. the development of the 132 kV gas-filled cable, and subsequent sea trials, in connection with the proposed cross-Channel cable link. He is director and general manager of W. T. Glover & Co., Ltd., and a director of the St. Helens Cable & Rubber Co., Ltd., Veedip, Ltd. (chairman), and Rotunda, Ltd.

Mr. R. McL. Fairfield

Mr. C. G. Tangye, M.I.Mech.E., has been elected chairman of the Council of the British Internal Combustion Engine Research Association in succession to **Mr. H. Norman G. Allen.**

Mr. L. A. Sawtell, commercial manager of the Entertainment Valve Department of Mullard, Ltd., celebrated his twenty-fifth anniversary

with the company on 20th August. Mr. S. S. Eriks, managing director of Mullard, Ltd., presented him with a gold watch and a cheque on behalf of the directors, and, with other directors and executives, entertained Mr. and Mrs. Sawtell to lunch.

Mr. F. J. Erroll, M.A., A.M.I.E.E., is a member of the parliamentary delegation which is visiting Russia at the end of this month.

Professor S. J. Davies, D.Sc., Ph.D., M.I.Mech.E., has accepted an invitation to be president of the Junior Institution of Engineers for 1954-55.

Mr. C. D. Wilkinson, M.I.Mech.E., M.I.E.E., formerly chief engineer of the No. 3 Area, East Midlands Division, has been appointed deputy chief engineer (collieries) at the headquarters of the National Coal Board. Mr. Wilkinson took up his duties in London on 1st September.

A dinner-dance with cabaret is to be held on 2nd October by the **Royal Engineers' Association, London Group,** at the Empire Restaurant, Wilton Street (Victoria Station), S.W.1 (7 for 7.30 to 11 p.m.). The guests of honour are to be Lieut.-General Sir Philip Neame and Lady Neame. Applications for tickets are invited from ex-Royal Engineers in and around London, especially from groups of ex-Sappers within electrical, engineering and building organizations. Tickets (10/6 each) and table reservations are obtainable from Mr. J. S. Pearson, Room 31, Horse Guards, Whitehall, S.W.1.

The annual students' social evening of the **Telegraph Construction & Maintenance Co., Ltd.,** was held on 10th September at the Town Hall, Greenwich. After dinner, which was attended by some 130 students and their friends, Mr. I. N. Patterson, chairman of the Telcon Education Committee, welcomed the guests, who included the principals of the technical colleges and representatives of Johnson & Phillips, Ltd., and Siemens Bros. & Co., Ltd. Dr. E. W. Smith, director of the Telegraph Construction & Maintenance Co. then presented awards to successful students. After a short interval there was a cabaret and dancing.

The South Wales area golf competitions in aid of the **Electrical Industries Benevolent Association** were concluded on 15th September, when the finals were played at Southerndown Golf Course. At the supper party held at the clubhouse, over which Mr. I. W. Bird, chief engineer of the South Wales Electricity Board, presided, the trophy and numerous prizes were presented to the winners by Mr. L. Howles, chairman of the South Wales Branch of the E.I.B.A., who drew attention to the arrangements being made by the Committee to hold the area's first dinner-dance at the Park Hotel, Cardiff, on 22nd October. The main competition for the Nichols-Moore Bowl was won, together with a tankard, by Mr. E. C. Bachelor, senior assistant engineer, generation, B.E.A. South Wales Division. Mr. E. J. C. Devriendt of the Board's Western Sub-Area headquarters, Tenby, was second. Mr. Arwyn Griffiths, of Carmarthen Bay (B.E.A. South Wales Division), received the prize for the best scratch score. A number of novel competitions were also held.

A large gathering attended the annual gala presented by the Northmet Sub-Area of the **Eastern Electricity Board** at Wood Green Baths, on 17th September, when clubs from eleven Districts and Departments competed. Among the attractions were displays and a water ballet given by the Voyagers Swimming Club. The evening concluded with a water-polo match against the Tottenham Division of the Eastern Gas Board, won by the home side by 6 goals to 4.

The annual works outing of the **Lindley Thompson Transformer & Service Co., Ltd.,** was held on 11th September. Five coaches took the employees and their friends to Southsea, and lunch was served at the Rock Garden Pavilion. Miss M. Lovegrove, an employee who has been with the company since its early days, in a short speech thanked Mr. and Mrs. J. Lindley Thompson for all they had done for them and on behalf of all employees presented them with a table lighter and silver serviette rings to mark the twenty-first anniversary of the formation of the company. Mr. Thompson expressed their thanks.

OBITUARY

Dr. E. L. Montagnon.—The death occurred on 3rd September, at the age of sixty-nine, of Mr. Edward Langlois Montagnon, Ph.D., M.I.C.E., a director of Ransomes & Rapier, Ltd. Dr. Montagnon was for many years with J. Stone & Co., Ltd., until joining Ransomes & Rapier, Ltd., of which he became chief engineer in 1940 and technical director in 1953. During his service with the company he was responsible for, or very much concerned with, much important work in the field of heavy engineering, including the design of sluices for the heightening of the Aswan Dam in 1932 and the sluices for all the more recent barrages undertaken by his company on the Nile, in India, Pakistan and Iraq, including the Sukkur and Kotri barrages and the great dam at Krishnaraga Sagara.

The late Dr. E. L. Montagnon

Mr. H. W. Hoover, for many years president of the Hoover Co., of America, died on 16th September at the age of seventy-six. Mr. Hoover was the first sales representative for the business, which was founded by his father in 1907. He became general manager of the company in 1908, and was president from 1922 until 1948, when he became chairman of the board of directors. He had paid many visits to this country and was last here in 1948. He established the British organization in 1919.

Mr. J. M. Young.—The death occurred recently, at the age of fifty-six, of Mr. John Malcolm Young, managing director of Unity Heating, Ltd.

Mr. W. H. Goodman.—The death is announced of Mr. W. H. Goodman, chairman of the Dubilier Condenser Co. (1925), Ltd. The original Dubilier Condenser Co. was formed in 1912 by Mr. Goodman, who was managing director until 1939. He continued as a director and consultant and was appointed chairman in April, 1945.

Mr. W. P. Dunfoy, a director of Mosses & Mitchell, Ltd., died on 16th September in his seventy-seventh year. Mr. Dunfoy had been associated with the company for nearly thirty-seven years.

Merseyside Lighting Committee

To further electric lighting development and to co-ordinate activities by each section of the electrical industry involved, the Merseyside Electrical Lighting Services Committee has been established. This organization, believed to be the first of its type in the country, has as founder members representatives of the Merseyside and North Wales Electricity Board, the Liverpool Branch of the Electrical Contractors' Association, Liverpool electrical wholesalers, the Merseyside and North Wales E.L.M.A. Lighting Service Bureau, the Liverpool Centre of the Illuminating Engineering Society and Liverpool Corporation. The chairman is Mr. T. K. Richardson (E.C.A.), the secretary Mr. A. Wilcock (E.L.M.A.) and the treasurer Mr. F. J. Burns (I.E.S.).

The Committee was originally formed as an *ad hoc* body in 1950 following a public lecture in Liverpool Philharmonic Hall. Electric lighting interests were so strongly represented that it was considered that the Committee should be kept in existence to maintain contact between trade organizations, to provide a platform for the exchange of ideas and to formulate policies which would promote lighting development.

It has now been decided to attempt more formal establishment of the Committee under an agreed constitution. Mr. Wilcock states that the aim is to supplement, not supersede, the efforts of the Illuminating Engineering Society and the Lighting Service Bureau.

I.E.C. Meeting in Philadelphia

AS previously reported in the *Electrical Review*, arrangements were made for holding this year's series of meetings of the International Electrotechnical Commission from 1st to 16th September in Philadelphia, U.S.A. Nearly fifty technical committees and sub-committees were in session to deal with questions of standardization.

The I.E.C. is affiliated to the International Organization for Standardization, dealing specifically with electrical aspects but maintaining its autonomy as regards policy, procedure and finance. It is governed by a Council drawn from the various nations, the executive body of which is termed the Committee of Action. The president is Dr. H. S. Osborne (U.S.A.); vice-president, Dr. Max Schiesser (Switzerland); treasurer, Dr. P. Dunsheath (U.K.); and administrative secretary, Mr. L. Ruppert. It works through national committees representative of professional, industrial and trade interests. That for Great Britain is appointed by the technical committees of the British Standards Institution, which nominated nearly 100 delegates for the present conference, headed by Lord Waverley (immediate past-president, B.S.I.).

The I.E.C. was established in 1904 as the result of an international meeting in St. Louis (U.S.A.) and advantage was taken of the present occasion to celebrate its golden jubilee on 9th September. After an address of welcome from the United States Government, Lord Waverley spoke of the importance of the work of the Commission and its implications in international relations and of the value of co-operative research that it fostered. His views were cordially supported in speeches by Mr. P. Ailleret (Electricité de France), Dr. L. A. DuBridge (California University) and Dr. Hakan Sterky (Sweden). The British National Committee has invited the Commission to hold next year's meeting in England.

Southend Electrification

THE British Transport Commission has placed an order with the General Electric Co., Ltd., for the complete electrical equipment for 32 four-coach multiple-unit trains to operate on the forthcoming Southend and Chelmsford extensions of the Eastern Region Liverpool Street–Shenfield electrification.

The equipment is designed for 1,500 V d.c. Each train unit will consist of a driving trailer, motor coach, trailer and second driving trailer. The motor coaches will be powered by four axle-hung motors, with series-parallel control by underframe-mounted electro-pneumatic contactor equipment providing automatic acceleration with two full-field and one weak-field continuous running notches. Mechanical parts of the rolling stock will be built at the Eastleigh Works of British Railways.

In general the electrical equipment will be similar to that designed and built by the G.E.C. for the eight three-coach sets which went into service on the Manchester–Glossop section of the British Railways Manchester–Sheffield electrification in June this year. The G.E.C. also supplied the electrical equipment for the first 1,500 V d.c. passenger rolling stock in Great Britain, which began to operate on the Manchester South Junction and Altrincham joint line in 1931.

Glasgow Transport Plan

IT was announced last week that the British Transport Commission was prepared, if the Glasgow Corporation co-operated, to spend several million pounds on the first phase of a scheme to electrify the railways in and around the city. This statement was made by Sir Ian Bolton, a member of the Commission, following a meeting of the Glasgow Passenger Transport Committee which was set up eighteen months ago to consider integrating the transport services in view of the city's traffic congestion. He said that the electrification would result in a substantial loss but the Commission realized that such a development was essential to the solution of the transport problem. It was suggested that the Corporation might be prepared to discuss the matter on the basis of mutual responsibility.

A joint committee representing the Commission and municipal interests is to be set up. The first routes to be electrified are likely to be those between Airdrie and Helensburgh and Balloch, Loch Lomondside, and the Glasgow suburban line known as the Cathcart Circle, which links several large housing schemes with a population of more than 50,000.

Facts About Selenium

THE electrical industry is a large user of the comparatively small amount of selenium available and naturally electrical applications of this semi-metal are extensively dealt with in a useful study published by the Department of Scientific and Industrial Research. (" Selenium: A Short Review of its Production and Utilization with reference to the Current Shortage," by R. Ashton, M.A., B.Sc., A.R.I.C., E. G. Hill, B.Sc., and D. Neville-Jones, M.A., B.Sc., H.M. Stationery Office, 1s 6d).

After a brief reference to the physical characteristics of selenium, its occurrence in copper, pyrites, sulphur, etc., is mentioned and there are notes on its separation and treatment and on the production of various countries which, with exports and imports, is later set out in an appendix.

Turning to the electrical and electronics industries, the authors state that 99 per cent of the selenium used by those industries is absorbed in the manufacture of dry-plate metal rectifiers, while the rest is used in photo-voltaic or barrier layer cells. An attempt is made to assess the importance of the selenium rectifier and to consider possible economies in the use of selenium for rectifiers. First the various types of rectifier are briefly dealt with—vacuum-tube, gas-filled (mercury vapour), crystal, vibrator and metal-plate. Then the different kinds of metal-plate rectifiers are studied—cuprous oxide, cupric sulphide and selenium. It is shown that selenium rectifiers offer many advantages over other types.

Research into the possibilities of reducing the amount of selenium required in a rectifier is touched upon and possible substitutes for selenium are considered—titanium dioxide and other semi-conductors and semi-metals. Next there are notes on the possibilities of germanium and silicon crystal rectifiers which are treated in a somewhat cautious manner.

The rest of the monograph is devoted to the role of selenium in the glass industry and the use of selenium pigments in plastics production. Brief references are made to the other applications of selenium, e.g., in rubber and steel, and as a catalyst. An appendix surveys the fundamental properties of metal rectifiers and crystal detectors.

Thermionic Valve Jubilee

THE jubilee of the thermionic valve is to be celebrated by the Institution of Electrical Engineers on 16th November next, fifty years exactly from the date of the application by Sir Ambrose Fleming for a British patent for his thermionic valve. To mark the occasion a special meeting will be held at the Institution.

The Marquess of Salisbury, Lord President of the Council, will open the proceedings at 2.30 p.m., following which there will be lectures on " The Genesis of the Thermionic Valve " by Professor G. W. O. Howe, and on " Thermionic Devices from the Development of the Triode up to 1939 " by Sir Edward Appleton. At 5.30 p.m., after a tea interval a lecture on " Developments in Thermionic Devices since 1939 " is to be given by Dr. J. Thomson. An exhibition of apparatus will be held at the Institution in association with the celebration.

Admission of non-members will be by ticket obtainable from the secretary of the Institution. Members wishing to bring visitors will therefore need to obtain tickets for them.

OVERSEAS ELECTRICAL TRADE

Exports Maintained in August

THE exports of electrical goods and machinery in August were at practically the same level as in the corresponding month last year, £12,440,554 compared with £12,469,381. Due to the summer holidays they were, however, well below the July total of £15,869,456. The cumulative total for the first eight months of the year amounted to £116,780,668 compared with £115,661,782 in January–August, 1953.

An analysis of the exports both for August and the first eight months of the year appears in Table I, indications of destinations being given in Table II. Further investigation of the figures reveals that New Zealand accounted for £269,968 of the £2,414,070 worth of generating plant and motors exported last month, the next largest buyers being Australia (£216,174) and South Africa (£212,030). South Africa (£338,364) and India (£335,920) were the best markets for convertors, rectifiers, transformers and switchgear.

South Africa (£216,393) took more than twice as much telegraph and telephone equipment in August as the next largest buyer, India (£92,609), which in turn bought valves to nearly twice the value (£294,062) of the next biggest purchaser, Canada (£189,057).

Shipments of cables and wires at £1,203,150 were still below the monthly average of £1,695,807, which is £990,187 less than the monthly average for January–August, 1953. India was again easily the best market, the total value of its purchases amounting to £207,478. New Zealand (£108,589) and South Africa (£65,462) were the next most important buyers.

Apart from the items covered in Table I the official returns include a number of other electrical items. Among these are washing machines, the August total for which was £249,103, making £3,045,383 for the first eight months of the year (against £2,253,315); welding electrodes £82,040, making £719,411 (£959,335); electric conduit tubes and cased tubes £50,137, making £542,971 (£649,019); electric locomotives £89,553, making £1,541,259 (£2,297,945); and diesel locomotives £249,446, making £2,481,092 (£406,742). There are also such other largely electrical items as pumps (£1,053,307 in August); cranes, lifts and escallators (£1,385,654); and air conditioning and refrigeration machinery (£679,080).

Imports of electrical equipment in August amounted in the value to £1,135,171 and included telecommunication equipment (£333,978); cathode ray tubes (£124,947); magnetos, etc. (£94,822); valves (£93,633); scientific in-

TABLE I.—ELECTRICAL EXPORTS

Class	August, 1954	Eight months ended 31st August	
		1953	1954
	£	£	£
Generating sets and generators:			
Diesel-driven, up to 10 kW...	84,566	676,729	811,527
Ditto, 10 to 65 kW	133,318	1,223,202	1,290,709
Ditto, 65 to 200 kW	111,516	681,605	714,744
Ditto, over 200 kW	344,239	1,153,010	2,789,521
Spark ignition engine driven	13,358	198,988	141,477
Steam turbine driven	17,444	1,425,801	614,273
Other prime mover driven	59,587	358,802	751,232
Generators	140,726	2,114,977	1,609,070
Parts of generators	578,504	4,041,311	3,239,478
Motors, complete, other than railway, tramway and trolley-bus:			
Up to ¼ h.p	148,310	963,262	1,450,603
Over ¼ h.p. but under 1 h.p.	44,835	262,340	396,428
1 h.p. to 250 h.p.	312,961	3,129,007	3,113,083
Over 250 h.p.	134,817	636,291	1,069,091
Railway, tramway and trolley-bus motors complete and parts of all motors	104,514	1,439,236	1,171,798
Motor starting and controlling gear	185,375	1,850,762	1,584,431
Converting machinery	15,192	336,370	219,430
Mercury-arc rectifiers	19,416	375,390	389,533
Transformers for lighting, heating and power (incl. coils)	696,143	8,079,810	8,098,602
Switchgear and switchboards (not telegraph or telephone)	1,132,516	10,962,595	10,517,192
Primary batteries:			
Lighting	73,025	484,955	543,582
Radio	134,332	694,866	1,166,831
Other	40,818	358,274	360,262
Parts (excl. carbons)	56,712	175,918	435,708
Lamps:			
Filament, exceeding 24 V	69,750	504,583	611,797
Ditto, under 24 V	30,101	170,807	239,052
Discharge lamps, fluorescent tubes, etc.	51,916	305,646	478,237
Other lamps	8,906	127,795	190,979
Radio and television, etc., apparatus:			
Cathode-ray tubes	6,907	101,416	73,465
Other valves (not X-ray)	156,052	1,367,892	1,313,694
Radio and television transmitters	24,321	520,376	455,988
Commercial radio and radar equipment	905,619	5,899,430	8,137,603
Domestic radio receivers, mains	163,097	1,604,704	1,321,610
Ditto, battery	73,195	371,397	458,199
Ditto, other (incl. car)	11,124	116,988	96,479
Radiograms	36,453	338,414	302,735
Television sets	43,606	208,812	189,529
Public address equipment	50,453	390,933	473,758
Sound reproducing app., n.e.s.	27,289	119,427	188,815
Components and parts, n.e.s., incl. parts of valves and c.r. tubes	480,808	3,299,385	4,489,342
Telegraph and telephone installations	465,370	3,443,344	4,748,929
Telephone instruments, separately consigned	80,061	1,327,546	880,252
Telegraph and telephone parts	390,893	5,035,886	3,775,309
Line apparatus for long distance commun.	98,741	1,452,897	1,160,443
Cookers	72,426	350,182	603,045
Toasters	15,952	121,546	146,755
Other cooking apparatus	42,627	155,305	270,164
Parts and accessories	39,192	225,834	335,638
Space heating appliances	24,315	154,157	269,538
Water heating appliances	22,130	203,986	204,018
Other heating appliances	24,629	196,020	266,424
Parts and accessories	59,012	339,397	384,784
Irons	43,758	372,775	479,381
Arc welding equipment, a.c.	28,424	391,814	276,858
Ditto, d.c.	66,548	295,937	403,053
Resistance welding equipment	18,682	86,596	139,683
Magnetos, ignition	10,751	166,670	118,556
Sparking plugs	122,971	916,296	1,157,806
Elec. appliances for aeroplanes, n.e.s.	106,244	1,110,457	1,475,001
Ditto, for motor vehicles, n.e.s.	217,800	1,349,548	1,889,705
Ditto, for cycles, n.e.s.	65,792	479,585	644,435
Signalling app. (incl. traffic signals)	70,532	512,939	445,399
Industrial radio-frequency equipment	7,936	110,278	155,766
Bell app. (not telegraphic or telephonic)	7,444	55,751	65,071
Instruments, commercial	114,636	1,094,396	1,165,586
House service meters (not prepayment)	116,798	633,045	955,844
Ditto, prepayment	11,853	74,861	119,949
Electro-medical apparatus (not X-ray)	39,804	305,577	362,556
X-ray apparatus (excl. tubes and valves)	52,219	471,601	390,634
Vacuum tubes	18,217	182,972	153,412
Desk fans	31,842	240,275	268,970
Ceiling fans	78,809	800,950	777,824
Vacuum cleaners	121,900	993,056	1,407,692
Floor polishers	55,550	497,208	845,284
Food mixers	39,167	318,787	382,495
Hair clippers and dry shavers	124,473	305,072	678,786
Other portable appliances	20,759	136,221	211,075
Parts	70,562	341,287	593,399
Portable elec. tools (not saws) and parts	150,819	1,089,312	1,259,385
Cables and wires:			
Telegraph and telephone, submarine	50,407	563,572	592,759
Ditto, other	180,063	5,810,282	2,705,525
Cotton, silk or art. silk insulated	25,746	489,555	299,395
Enamel, glass or asbestos insulated	82,384	721,622	571,706
Paper insulated	281,922	7,962,347	4,269,452
Rubber insulated	365,595	3,591,489	3,215,285
Other	217,033	2,349,088	1,912,333
Accumulators for motor vehicles	169,092	1,125,297	1,274,136
Ditto, traction	21,077	132,469	189,007
Ditto, radio and other portable	33,960	345,627	284,447
Ditto, other	34,635	410,724	437,098
Parts and accessories	46,089	381,561	482,264
Elec. porcelain, etc. (incl. insulators)	59,177	643,091	693,966
Insulating cloth and tape	43,605	321,000	393,910
Other insulating material	69,658	473,156	590,667
Permanent magnets	40,655	241,479	329,318
Radio, telegraph and telephone testing equipment, n.e.s.	233,846	1,226,425	1,685,992
Scientific elec. instruments (not telegraphic or telephonic)	112,816	697,668	990,335
Electrical machinery, n.e.s.	478,118	4,556,046	4,248,302
Electrical apparatus and appliances, n.e.s.			
TOTAL	12,440,554	115,661,782	116,780,668

TABLE II.—DISTRIBUTION OF ELECTRICAL MACHINERY, APPARATUS AND APPLIANCES

Country	Aug., 1954	Eight months ended 31st August	
		1953	1954
	£	£	£
Channel Islands	51,686	327,315	435,382
Gibraltar	12,069	143,485	72,140
Malta and Gozo	15,261	197,878	345,542
Cyprus	29,339	362,934	489,559
Sierra Leone	10,854	234,676	219,395
Gold Coast	182,622	816,347	905,640
Nigeria	151,154	1,546,870	1,223,537
Union of South Africa	1,179,900	14,337,337	12,500,111
Northern Rhodesia	152,972	963,354	936,918
Southern Rhodesia	218,206	1,826,274	1,668,101
Tanganyika	93,878	409,536	510,918
Kenya	116,968	1,732,213	1,164,921
Uganda	47,262	536,860	504,560
Nyasaland	11,523	111,121	82,000
Mauritius	10,225	215,785	177,741
Aden	31,513	1,260,821	689,059
Bahrain, Qatar and Trucial Oman	112,580	804,668	983,351
Kuwait	84,079	1,145,117	1,039,753
India	1,390,513	12,706,633	10,590,354
Pakistan	358,264	1,215,728	3,814,984
Singapore	303,022	2,109,875	2,170,354
Federation of Malaya	256,255	2,079,846	1,821,057
Ceylon	111,455	1,184,830	994,176
British North Borneo	29,177	233,709	273,114
Hong Kong	156,773	1,499,673	1,325,045
Australia	1,020,025	12,177,139	11,707,191
New Zealand	909,924	6,168,870	6,604,783
Canada	739,145	5,984,443	4,888,465
Jamaica	45,022	493,027	514,484
Barbados	22,975	113,250	167,409
Trinidad	62,840	582,941	645,675
British Guiana	25,936	234,537	285,621
Anglo-Egyptian Sudan	69,524	844,891	791,392
Other Commonwealth countries	111,987	923,266	953,656
Irish Republic	227,732	2,343,255	2,181,768
Soviet Union	61,173	202,477	1,568,653
Finland	109,849	557,860	920,391
Sweden	277,942	2,614,468	2,858,782
Norway	231,646	1,909,767	2,022,524
Iceland	11,415	146,888	109,819
Denmark	135,852	792,383	1,387,503
Poland	15,843	867,792	529,834
Western Germany	143,713	644,032	983,141
Netherlands	361,748	3,150,734	4,307,877
Belgium	152,674	1,992,928	2,039,190
France	153,143	1,929,360	2,214,697
Switzerland	42,810	579,045	721,392
Portugal	80,152	1,000,796	1,626,539
Spain	373,055	2,077,381	1,937,145
Italy	161,593	1,425,582	1,876,000
Austria	23,330	362,019	500,029
Czechoslovakia	982	43,764	30,102
Yugoslavia	44,816	396,054	801,725
Greece	104,658	676,641	578,081
Roumania	13,277	1,075,574	14,942
Turkey	33,160	926,468	392,353
Netherlands Antilles	4,538	110,121	53,594
Belgian Congo	39,789	277,096	237,446
French Morocco	11,256	190,334	190,524
Angola	6,659	81,918	77,936
Portuguese East Africa	22,110	169,277	187,662
Syria	29,708	191,340	217,430
Lebanon	21,475	289,537	271,545
Israel	10,705	429,711	261,696
Jordan	19,174	185,236	169,561
Egypt	81,378	875,836	749,783
Libya	7,901	152,384	71,487
Saudi Arabia	42,298	358,044	438,425
Iraq	226,950	1,689,242	1,862,241
Iran	48,483	154,015	278,061
Burma	144,792	777,409	1,072,964
Thailand	111,225	1,035,487	1,297,071
Indonesia	52,954	570,591	355,293
Japan	17,609	384,601	284,819
United States of America	161,470	1,490,409	1,975,433
Cuba	7,666	146,605	152,831
Mexico	34,926	239,663	222,942
Colombia	81,596	446,207	616,129
Venezuela	100,331	1,219,581	1,191,272
Peru	9,264	277,133	246,853
Chile	9,242	255,945	210,823
Brazil	30,614	887,010	616,605
Uruguay	39,005	166,235	589,284
Argentine Republic	47,536	382,232	651,472
Other foreign countries	134,409	988,070	1,130,611
TOTAL	12,440,554	115,661,782	116,780,668

struments (£92,674); electromedical apparatus (£43,175); convertors, rectifiers, transformers and switchgear (£37,634); generators (£21,910); motors (£21,377) and cables (£4,266). Holland (£296,191), the United States (£285,645) and Western Germany (£135,440) supplied the bulk of the equipment. The total electrical imports for the first eight months of the year stands at £10,762,635, which is £4,690,446 more than in the corresponding period of 1953.

BRITISH STANDARDS INSTITUTION

FOR the first time since the war, the British Standards Institution has published a full printed report of its activities, which cover sixty major industries. This report of 200 pages, which relates to the year ended 31st March, 1954, is obtainable at 5s from the Institution, 2, Park Street, W.1. It shows that several thousand projected standards were in various stages of development and that there were over 100 subjects in which international alignment of standards was being promoted through the International Organization for Standardization and the International Electrotechnical Commission. A list of members of the principal councils and committees is included; that for the electrical industry itself (chairman, Mr. J. R. Beard) contains forty names, but many more are included under specialized headings. Sir Roger Duncalfe became president last November in succession to Lord Waverley.

New and revised standards issued during the year numbered 286, and 914,000 copies of standards were sold, about one-quarter overseas. Subscribing members totalled 7,800. There were 2,388 standing committees with a membership of 14,000, which held 3,920 meetings. As from 1st April the B.S.I. became responsible for Codes of Practice relating to buildings and civil, electrical and mechanical engineering.

Important B.S. published or in preparation included: Dimensions of fractional horse-power motors (published as B.S. 2048); dimensions of three-phase foot-mounted totally enclosed induction motors up to 20 h.p.; rotating electrical machinery, for which B.S. 168, 169, 225 and 226 are being combined in a single standard providing for ratings above 50 h.p. to be on a continuous maximum basis; reduced thicknesses for rubber-insulated cables and new standard for p.v.c. cables; and revision of B.S. 480, paper-insulated cables, to include 33 kV ratings and aluminium sheathing.

Two sections of the International Electrotechnical Vocabulary (being prepared by the I.E.C.) dealing with fundamental terms and with machines and transformers have been published, Unesco contributing to the printing costs. The Ministry of Fuel and Power has agreed that meters with cyclometer dials may be approved although not covered by B.S. 37, but otherwise only types of meters that comply with B.S. 37 will be approved unless at the request of the B.S.I. Revision of B.S. 229 (flameproof enclosures) is under consideration to take account of recent research and to bring it into line with an I.E.C. draft specification.

New editions of B.S. 727 and 800 (radio interference) have been published and special problems arising at the higher frequencies to be used are being studied. Conditions of use of capacitors in suppression devices are often more onerous than those in radio receivers; and discussions on the subject have delayed revision of B.S. 613 (components for radio interference suppression devices), the work on which is nearing completion. References are also made to work in hand on illumination and instruments.

LETTERS TO THE EDITOR

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Earthing Methods

I MUST admit that Mr. Winchester (*Electrical Review*, 17th September) has posed one of the most difficult problems for solution by leakage trip—a group of houses or flats fed from one common copper main water service—but he does not mention the most troublesome part. This is, the likelihood of all trips connected being operated simultaneously with the rise of voltage on the low impedance copper pipe.

In view, generally, of the low incidence of earth faults, and the fact that water heaters are often fitted over baths, wash-basins or sinks, I am wondering if the simultaneous operation of all leakage trips in, say, a block of flats is really so serious. After all, the trips are easily reset, and if the situation warrants it, indicating lamps could be situated in a convenient place showing if the current were temporarily off.

I do not follow Mr. Winchester's point that shock risks will be set up with the non-operation of a trip for the reason he puts forward—inadequate voltage gradient. Surely if the trip refuses to operate for this reason the voltage is not there to cause shock. Much depends, however, on the situation of the trip, and it is advisable to place it so that it parallels the user's body. For instance, is it so fantastic to consider a trip connected between a water heater placed over a bath and to the bath itself—ignoring any connection to real earth? More practically, it is desirable to place a trip near the equipment it protects and not at the main intake position, as it will tap maximum voltage at the former point; the recent introduction of the 15 A trip and 13 A socket makes this simple.

Folkestone. T. C. GILBERT, M.I.E.E.

Elderly Engineers

FOR some years, engineering journals have been drawing attention to the problem of the elderly engineer, or executive, or retired officer. Under modern conditions, many of these men, after having spent a lifetime in promoting the welfare of others, find themselves reduced in circumstances, with consequent loss of status as well as reduced remuneration.

Whole-time work is not necessarily the complete answer to the problem of the retired engineer and, in the belief that a worthy object such as this should be the concern of a corporate body, a few chartered engineers in good standing have formed "The Association of Retired Industrial Executives," for three important purposes:—

(1) The part-time employment of retired executives.

(2) The supply of pre-digested information for industry.

(3) The use of collective creativeness, in the form of a Guild of Inventors for youngsters with character, high intelligence, good education, and the ability to express themselves.

Efforts made over many years by Mr. C. E. R. Sams, past-president of the City and Guilds Institute, extended to the provision of whole-time employment for engineers; but executives or any others with electrical engineering or administrative skills would be welcome; they might find interest as well as possible part-time remuneration in keeping in touch with the flow of vitally important information which bears upon their own technological experience.

Such an association would have local branches, the existence of which would provide opportunities for social occasions, lectures, discussion groups, collective approach to local industries, and the organization of educational guidance and selection methods for the coming generation.

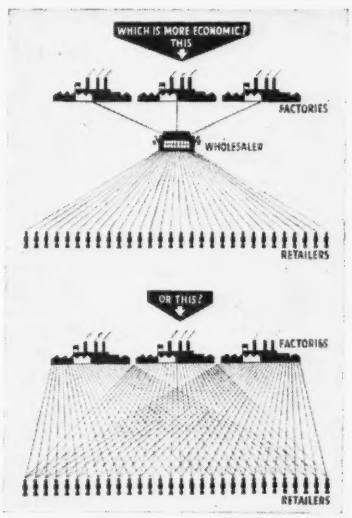
Branches abroad could assist the export firms by market research and sales promotion; wherever English is spoken we could have a high quality part-time expert, constantly in touch with the London headquarters.

Further information will gladly be sent on request, preferably accompanied by a self-addressed envelope and loose stamp, or reply-coupon from readers abroad.

139, *Strand, London, W.C.*2. G. W. WILLIAMSON.

Wholesalers and Retailers

AN interesting piece of publicity on the general subject of wholesaling, with which many will be in whole-hearted agreement, has been issued by the Federation of Wholesale Organizations. I would in particular refer to the last page of this booklet, which shows in graphical form the chaos which would arise if wholesalers were cut out. The acid test of this, of course, is whether the wholesaling organizations throughout British trade believe their own story, and I would like to see another graphical representation, indicating the chaos which does exist by reason of the wholesalers who are not prepared to keep their station, and want not only to supply retailers, but also to cash in on retailers' customers.



If this book, and the ideas it tries to foster, are not to be consigned to the w.p.b., surely wholesalers have got to give a much more realistic demonstration of their belief in the principles which they claim for themselves but deny to others.

*London, E.C.*4. J. MORTIMER HAWKINS, *Managing Director*, Mortimer, Gall & Co., Ltd.

Repairing Small Motors

In our issue dated 10th September we published a review of the book "The Repair of the Small Electric Motor," by K. Wilkinson, and erroneously stated that it was published by Sir Isaac Pitman & Sons, Ltd. The book is published by E. & F. N. Spon, Ltd., 15, Bedford Street, London, W.C.2, and the price is 20s.

INDUSTRIAL NEWS

English Electric Protest

It is reported from Seattle, Washington, that the Seattle Board of Public Works last week rejected all five tenders for generating plant submitted after a second call. Among the offers was one from the English Electric Co. which was among the previous tenderers. The company claims that its tenders on each occasion were the only ones to comply fully with the specifications. It has protested against the rejection of its offer and has asked for a full explanation of the reasons.

Aluminium-Sheathed Cable for Scotland

A contract valued at £40,000 has been placed by the South-East Scotland Electricity Board with British Insulated Callender's Cables, Ltd., for the supply and installation of an aluminium-sheathed 33 kV impregnated pressure cable in the Board's Fife Sub-Area. The 7,050 yd of three-core cable—which is the first aluminium-sheathed impregnated pressure cable to be laid in Scotland—will run from Townhill power station, outside Dunfermline, to a substation in Nethertown.

The principal cable consists of 0·25 sq in died down screened conductors, paper insulated and aluminium sheathed, protected overall by a combination of p.v.c. tapes, self-sealing rubber tapes and hessian tapes, and will operate at 33 kV. At one point the cable route passes through a loch and on this section a specially designed long length of lead-sheathed underwater cable will be laid. A short length of solid type cable will be used at the terminations. The cable is expected to be in commission by July, 1955.

Contractors Criticize Boards

The trading activities of Electricity Boards are criticized by the Swindon Branch of the Electrical Contractors' Association in a report submitted to the local Chamber of Commerce. It is to be passed on to the National Chamber of Trade for use in connection with the preparation of evidence for the independent inquiry into the electricity supply industry. The report complains that Government funds are used to finance hire-purchase sales on more attractive terms than the private trader can offer. It is further contended that electricity showrooms are maintained in order that the Boards can engage in trading, but that their charges are passed to supply account. The consumer is called upon to pay through his meter for all the Boards' expenditure and it is suggested that for this reason the traders have been singled out for special treatment. The maximum demand tariff bears hardly on traders but is favourable to factories. Extravagance is alleged. It is said that the Boards' average overhead charge on sales and contracts is 23 per cent whereas a cross-section of E.C.A. members discloses that their figure is 17 per cent. Productive journeymen electricians are being attracted away from contractors and then placed in non-productive positions.

Electricity Inquiry Office

The inquiry bureau of the British Electricity Authority has been moved to British Electricity House, Trafalgar Buildings, S.W.1 (Whitehall 2121).

The Authority's "More Power" exhibition remains at the Winsley Street, W.1, administration offices (over Waring & Gillow's store in Oxford Street). This exhibition, which is open to the public between 10 a.m. and 5 p.m. on weekdays and from 10 a.m. to 12 noon on Saturdays, is designed to explain in simple terms the organization of the electricity supply industry. In particular, it deals with the Authority's power station construction programme and shows what is involved.

Port Electricians Strike

About 500 electricians at ship repairing establishments in the Port of London ceased work on Tuesday last. The reason was the dismissal of five members of the Electrical Trades Union by R. & H. Green and Silley Weir, Ltd., Blackwall. It was said that these dismissals were not in accordance with the "last in—first out" arrangement.

Marchwood Generating Station

In referring to the laying of the foundation stone of the Marchwood generating station in the *Electrical Review* on 17th September the station was described early in the note as a 180 MW station. We are asked by the B.E.A. Southern Division to make it clear that the ultimate capacity will be 480 MW.

Contract Price Formulæ

The British Electrical & Allied Manufacturers' Association has issued the figures for its contract price adjustment formulæ. In each case the rate of pay for adult male labour at 18th September is deemed to be 150s 6d. The "cost of material" figures are:—

For electrical machinery and equipment the Board of Trade index figure published on 18th September is 159·4. (The figure of 150·8 given in our issue of 3rd September should have read 159·8.)

For turbo-generating and allied plant: materials used in mechanical engineering industries, 150·6, blast furnaces and iron and steel smelting and rolling (40 and 41), 146·3. (The figure for July, published on 14th August, has been revised to read 146·3.) The price of ⅜in o/d 18 s.w.g. brass condenser tubes (*Metal Bulletin*, 17th September) is 3s 7⅞d per lb. Outstanding contracts covered by the B.O.T. intermediate products index: the index figure for intermediate products (18th September) is 360·9.

Prices of Materials

In the accompanying table we give the basis prices of the more important materials used in the electrical industry. The figures given are the selling prices and are those quoted on Tuesday last.

ALUMINIUM Ingots	ton £156 0s 0d
COPPER, H.C. Electro	ton £253 10s 0d
Fire Refined 99·70%	ton £252 0s 0d
Fire Refined 99·50%	ton £251 0s 0d
COPPER Tubes ..	lb 2s 5½d
Sheet	ton £314 15s 0d
H.C. wire and strip ..	ton £284 15s 0d
LEAD, English ..	ton £101 5s 0d
Foreign	ton £100 0s 0d
MERCURY	flask £103 0s 0d
TIN, block (English) ..	ton £738 10s 0d
ZINC, G.O.B. Foreign	ton £80 15s 0d
Electrolytic	ton £84 10s 0d
BRASS Tubes (solid drawn)	lb 2s 0d
Sheet	ton £256 0s 0d
Wire	lb 2s 7¼d
PHOSPHOR BRONZE Wire	lb 3s 11½d
PLATINUM	oz £30 0s 0d
RUBBER, No. 1 R.S.S. spot	lb 20⅝d–20¾d

B.S.I. Consumer Report

The first issue of "Consumer Report," the British Standards Institution's new four-page publication of interest to women and to all who do household shopping is now available. It includes a description of the existing British Standards for electric plugs and sockets and is intended to meet the criticism that it is not enough to produce standards for consumer goods unless the general public gets to know about them. Copies will be circulated free to women in all parts of the country. Further information and copies of future issues can be obtained on application to the B.S.I., British Standards House, 2, Park Street, London, W.1.

Kidbrooke Schools

With reference to the description of the electrical installation at Kidbrooke Schools which was published in our issue of 13th August we are informed that in addition to amplifiers made by the General Electric Co., Ltd., and Reproducers and Amplifiers, Ltd., loudspeakers manufactured by Wharfedale Wireless Works and the Plessey Co., Ltd., are employed.

Technical Colleges and Industry

The report of the Technical Colleges and Industry Conference, organized by

The current window display of "Creda" cookers at the London showrooms of the Simplex Electric Co., Ltd.

the Education Committee of the Federation of British Industries, and held at Ashorne Hill, Leamington Spa, from 5th to 7th May, has now been published in booklet form. The principal speeches are given in full whilst in a preface the main issues raised are summarized. Copies of the booklet (4s 6d) are obtainable from the F.B.I., 21, Tothill Street, London, S.W.1.

Inquiry into Linesman's Death

Giving evidence at an inquiry held at Aberdeen last week, Mr. P. Kirkwood, district engineer of the North of Scotland Hydro-Electric Board, said that despite warnings linesmen persisted in not using earthing sticks before touching overhead wires. Asked why, he said that they felt it was a waste of time to check the wires with the stick.

The inquiry was into the death of John Muir Ross (29), who received a fatal shock while inspecting an overhead line. Mr. W. Thomson, who was with him, said there were earthing sticks among the equipment but they did not carry them because they had been told that the supply had been cut off.

Returning a formal verdict, the jury added a rider that Ross had contributed to the accident by his failure to use an earthing stick provided by the Board for his safety. It was also noted that the circuit diagram drawn up by the Board to show the electricity position in the area had not been kept up to date.

Commercial Television

In about a year's time the Independent Television Authority expects to start broadcasting commercial television programmes in the London, Birmingham and Manchester–Liverpool areas. The chairman, Sir Kenneth Clark, announces that Sir Robert Brown Fraser has been appointed director-general of the Authority. Since 1946 Sir Robert has been director-general of the Central Office of Information.

The Authority has now ordered three Marconi 7½/10 kW vision transmitters which, it is estimated, will each give an effective radiated power of 100 kW and have a range of 40 miles. Orders are also in course of being placed for three Pye 5 kW transmitters with 25 kW amplifiers and these should also give an effective radiated power of 100 kW. The B.B.C. has agreed in principle to the Authority sharing its transmitter masts but a definite decision has not yet been made because there are many technical difficulties to be overcome, including those concerning the servicing of aerials and the sharing of existing buildings on the sites.

New Brush Group Company

The Brush Group, Ltd., will in future trade in Venezuela under the title Brush Group de Venezuela Sociedade Anonima. Mr. C. P. Court, formerly on the staff of the Group's agents, Compania Anonima Motoria, has been appointed director and manager. Brush Group de Venezuela Sociedade Anonima will be responsible for the sale of products from the following factories: Brush Electrical Engineering Co., Ltd., Loughborough and Cardiff; Petters, Ltd., Staines; J. & H. McLaren, Ltd., Leeds (including Petter-McLaren and Petter-Fielding engines); National Gas and Oil Engine Co., Ltd., Ashton-under-Lyne; and Mirrlees, Bickerton and Day, Ltd., Stockport. The new company will also represent Enfield Cables, Ltd., in Venezuela.

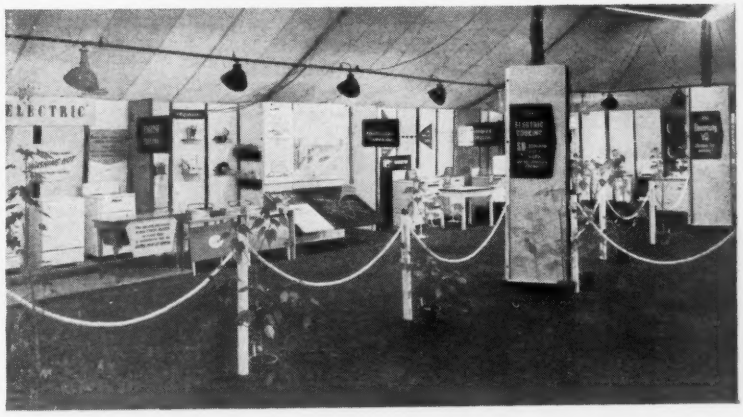
Plant for Burma

The power division of Clarke-Built, Ltd., Chiswick, London, has just completed a contract for the Burmese Government for diesel generating sets. The contract provided that the sets should be semi-mobile and capable of operating continuously for long periods, with the minimum of maintenance, under tropical conditions. The order was for twelve Clarke-Built sets of 22 kVA output powered by the new Ford industrial diesel engine, two sets of 100 kVA output, and two sets of 75 kVA output powered by Dorman direct injection diesel engines. The last of these generators, all of which were supplied mounted on skid bases and fitted with semi-waterproof housings, has now been shipped.

Willesden Civic Show

The Willesden Civic Show which was held at Roundwood Park, Willesden, on 11th and 12th September, is one of the largest of its kind in Southern England. It was opened by the Mayor of Willesden, who was joined by several members of the Corporation and nine Mayors of neighbouring boroughs. In the trades section, the London Electricity Board, for the first time at these annual Willesden Shows, organized an exhibition of electrical apparatus in a large marquee. A number of manufacturers

The London Electricity Board marquee at the Willesden Show



participated in the exhibition and were allocated their own separate stands for display and demonstration. The emphasis was on electricity in the home and throughout the two days the continuous demonstrations which took place aroused great interest.

The competitions which took place at this Show attracted an interest far beyond the boundaries of the Willesden district, and exhibitors came from various parts of the country. Evidence of this was not only shown in the large number of exhibits displayed in the various sections, but also in the large number of inquiries received in the electricity marquee, which included some from places as far afield as Princes Risborough, Leighton Buzzard and even Pembrokeshire. The Show was attended by 34,000 people.

Window Display Competition

A window display competition for dealers is being organized by Hoover, Ltd., as part of a "National Hoover Week" campaign (2nd–9th October). There will be three classes: Electricity Board showrooms, departmental stores and home furnishers, and electrical contractors and ironmongers. Local winners in these classes will each receive five guineas, and will then be judged for the national contest for first, second and third prizes of 50, 25 and 15 guineas in each class, and a special 100 guineas prize and challenge cup for the best window of all.

Trade Announcements

Claude Lyons, Ltd., has acquired a new freehold factory with a view to covering more efficiently its South of England activities. The premises comprise 11,200 sq ft of offices, development laboratories and storage and garage facilities. They are known as Valley Works and are situated at 4–10, Ware Road, Hoddesdon, Herts (telephone: Hoddesdon 3007/8/9). For the present the existing offices at 180–182, Tottenham Court Road, London, W.1, will continue to function for the handling of all normal inquiries, but it is anticipated that on or about 30th September all business will be transacted from Hoddesdon. The head offices and works at 76, Oldhall Street, Liverpool, 3, will continue to function normally.

Chamberlain Industries, Ltd., has recently appointed **Drummond Asquith (Sales), Ltd.,** of King Edward House, New Street, Birmingham, 2, as sole distributors in the United Kingdom of the production tube bending machinery manufactured in conjunction with Walter P. Hill, Inc., of Detroit, Michigan, U.S.A.

Grey & Marten, Ltd., have opened a Manchester office at 4, Station Buildings, Altrincham, Ches. (telephone: Altrincham 5018).

Mansfield Factors (Electrical Supplies), Ltd., have opened a branch at 207, Chatsworth Road, Chesterfield (telephone: Chesterfield 2414) where a comprehensive stock is held.

Straight-Lite Reflectors, Ltd., have moved to larger premises at 36, Eden Grove, Holloway, London, N.7 (telephone: North 4296).

Metal Products, Ltd., has moved its London office to 17, Stratton Street, W.1. The telephone number is unchanged.

Mr. E. Theobald has been appointed by **Chilton Electric Products, Ltd.,** as sales executive for its electric dry shavers and shaver accessories for the London area.

The address of the **Baldwin Electrical Co. (St. Marylebone), Ltd.,** is now 43, Dorset Street, London, W.1. The telephone number (Welbeck 1638) is unchanged.

Catalogues and Lists

Williams & Womersley, Ltd., Ings Foundry and Engineering Works, Wakefield.—32-page handbook giving details and prices of "Veeflex" V-rope drives and pulleys, together with useful charts and tables.

Ekco-Ensign Electric, Ltd., 45, Essex Street, London, W.C.2.—Price list and catalogue of "Ekco" lamps and priced leaflets dealing with fluorescent lamps and fittings, including the "Ekco White" fluorescent lamps.

Stephen Glover & Co., Intown, Walsall.—Illustrated brochure on hand-wrought iron domestic lighting fittings, outside lanterns and brackets.

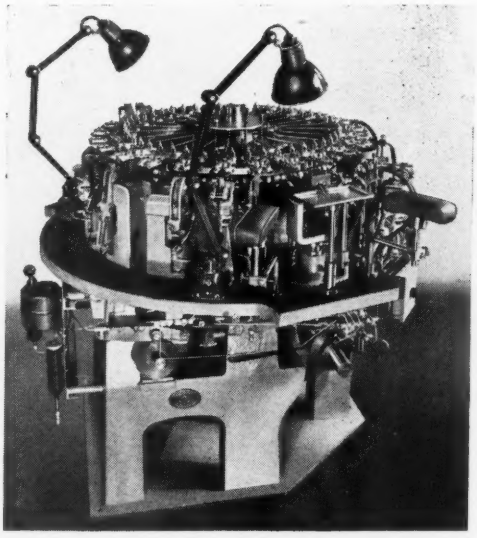
A. Reyrolle & Co., Ltd., Hebburn, Co. Durham.—Technical pamphlet on Type JKSS ring-main and tee-off fuse switch units for outdoor service (1281).

Doran Instrument Co., Ltd., Stroud Glos.—Two pamphlets describing the company's range of electrodes and their dual titrometer, together with price lists.

General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.—Brochure outlining the ratings and prices of "Osram" fluorescent tubes.

Lamp Making Machinery

TO produce fluorescent lamps of high efficiency and long life, manufacturing processes must be accurately controlled; at the same time production must be at an economical rate. In view of this Benn (London), Ltd., 105–107, High Road, Wood Green, London, N.22, have embarked on the design and manufacture of a complete chain of high speed machines for making these lamps. The illustration shows one of the chain, an automatic cathode mounting and emissive coating machine with the top cover and guards removed.



Automatic cathode mounting and emissive coating machine for fluorescent lamps

The numerous mechanical operations of this machine are achieved with the minimum number of moving parts to reduce maintenance. It is fully automatic and the fact that the various operations are rigidly controlled to a high degree of accuracy has a great bearing on the future life of the finished lamp. Once the machine has been set and percentage tests taken, it takes care of constant production conditions.

High speed machinery often gives trouble through the lack of proper lubrication. In this machine the main gearbox bearings are continuously flushed with oil from the gearbox sump. All other fixed bearings are piped up to a hand forced feed pump which is operated once a day. One compression of the lever supplies the right amount of oil to each bearing. There are only a few parts which need to be independently lubricated and these are all accessible and require very little oil periodically.

As already mentioned, all operations are automatically controlled, including electrode cropping, setting, flattening, hooking, filament mounting and emissive coating, also loading and unloading. Cathodes are loaded on to an automatic drum feed mechanism by hand, a simple operation that also permits a final visual cathode inspection, but the company is devising an automatic cathode feed to the drum, and provision is made on the machine to accommodate this mechanism if required.

Some fluorescent lamp manufacturers produce both stems of the lamp with an exhaust tube; as only one is required for the pumping operation, the other tube has to be sealed off before pumping. This is simply to facilitate the cathode mounting operation. The machine described here makes the second exhaust tube unnecessary since it mounts the cathodes whether there is an exhaust tube or not.

Though the mounting mill was originally designed to produce 1,000 mounted stems an hour, trials indicate that a constant speed of 1,500 stems an hour can be safely achieved.

Atmospheric Pollution

National Smoke Abatement Society's Annual Conference

THE twenty-first annual conference of the National Smoke Abatement Society, which was opened at Scarborough on Wednesday with an attendance of 500 members and delegates, is the largest yet held.

In his presidential address, Sir Ernest Smith (chairman, Industrial Coal Consumers' Council) said that although nuclear energy and possibly other sources of energy were coming, reliance would have to be placed mainly on coal for the immediate future, even though it would become scarcer, more difficult to mine and poorer in quality. The surest means of reducing smoke nuisance was to use fuel with the maximum practicable efficiency. Coal measures, accumulated over millions of years, were being used up with prodigality.

Advances made in recent years in three of the major coal consuming industries had brought about an annual saving of 47 million tons. Improvements in efficiency in 1952 over 1925 had resulted in savings of over 27 million tons in electricity generation, 3·2 million tons in gas making and 43·7 million tons (at the same level of consumption) in the iron and steel industry. Knowledge of "smog," how it was built up and moved about, had been handicapped because few measurements of the pollution had been taken at critical times. Now the fuel research authorities were considering enlisting the aid of the Civil Defence organization in taking the requisite measurements. Large-scale dispersal of fog by spraying it with certain dilute chemicals was to be tested by the Fuel Research Station.

The Public's Attitude

An address was delivered in the afternoon by Sir Hugh Beaver (chairman of the Government Committee on Air Pollution), who said that his Committee had virtually completed its report. Referring to the interim report, published last winter, he stated that nothing heard or seen during the past year's intensive study and investigation had shaken the Committee's conviction that the annual loss estimated as due to air pollution overstated the case. The cures for smoke were known; the only question was the best practical steps and the will to carry them out. Any expenditure on it would be a very profitable investment.

No Government could be very far in advance of public opinion. Would public opinion be any more effective in regard to air pollution than in forcing road safety? The trouble was that everyone played two parts; the citizen with strong feelings as to public rights and the common weal and the individual with personal idiosyncrasies. He might subscribe to the Smoke Abatement Society and yet enjoy an open coal fire. What was needed was such pressure of public opinion as would both demand and make possible action to cure air pollution while accepting the results of such action. It was wholly wrong to look on this air pollution menace in terms of periodical or occasional abnormal concentrations. The loss to this country in health and wealth and efficiency was a continuing process. The London smog only laid dramatic emphasis on what was going on all the time.

The Committee had been struck by the differing attitudes of the local authorities. In some there were demands for action and signs of self-congratulation or of envy in regard to the establishment of smokeless zones as in the centre of Manchester and in Nottingham. The lengthy detailed investigation which Glasgow had to make in deciding the practicable boundaries of its first smokeless zone was both a lesson and an encouragement. But the same enthusiasm did not prevail everywhere.

Railway smoke was the subject of Thursday's discussion when Mr. R. F. Harvey (chief officer for motive power, British Railways) described methods introduced for cutting down smoke from coal-fired locomotives and the progress being made or planned for new smokeless forms of traction.

The Transport Commission was giving consideration to schemes for further electrification. He said that 270 diesel shunting engines were now in use, and during the next five years a further 573 would take the place of steam locomotives. The number of diesel railcars was also being increased. There were now two experimental oil-gas-turbine locomotives with final electric drive operating on British Railways. A further experimental gas turbine locomotive, with mechanical transmission, was under construction; this would use pulverized coal and would be placed in service experimentally in 1955 or 1956.

Reducing Industrial Smoke

How the smoke of industry could be, and was being, reduced by the use of gas and electricity in place of raw coal was the theme of the afternoon's session under the chairmanship of Dr. W. A. Macfarlane (director of the National Industrial Fuel Efficiency Service).

Mr. R. F. Hayman (Gas Council) stated that 56,000 factories using gas took 25 per cent of the total production. The bread baking load in the North Thames area had grown over a hundredfold since 1945—from 65,000 to 7 million therms a year. In the potteries 23 million therms were used in 1952; 280,000 tons of coal were required to make this gas, replacing 336,000 tons of raw coal previously used.

Mr. J. I. Bernard (Electrical Development Association) said the electricity bill almost always formed a very small percentage of production costs. At 1d per kWh the cost expressed as a percentage of the value of the product was about 4½ per cent in metal manufacture and from 1 to 3 per cent in other industries. The average worker in the U.S.A. produced between two and three times as much as the British and operated about 8 h.p. as compared with 3½ h.p. Increased production due to improved lighting ranged from 5 per cent for rough work to 25 per cent for fine work like type setting. Instances were cited of multi-motored machines which carried out a number of operations in automatic sequence started by push-buttons. For the highest precision and fastest speed of control electronic methods and servo-mechanisms were coming into increasing use. Electricity for heating was second only in importance to electric power and was used largely because of the increased productivity it made possible through precise temperature control. Examples were given of the savings secured in capital and working costs per ton of steel compared with open-hearth working and of the field and merits of various types of heating—arc, induction, resistance, infra-red and dielectric.

I.E.E. LONDON MEETINGS

Programme for First Half of Session

THE London meetings of the Institution of Electrical Engineers for the 1954–55 Session commence on 7th October, when the President, Mr. J. Eccles, will deliver his inaugural address. For the convenience of members we give below the list of meetings to be held during the first half of the session arranged under their respective headings.

In addition to these meetings we would draw particular attention to the celebration of the jubilee of the thermionic valve on 16th November, details of which are given elsewhere in this issue. The Faraday Lecture will be given by Mr. T. B. D. Terroni, manager and chief engineer (transmission division), Automatic Telephone & Electric Co., Ltd., and his subject will be "Courier to Carrier in Communications." This will be given in London at the Central Hall, Westminster, on 27th January. Social functions to note are the dinner of the Measurements Section on 9th November and the dinner-dance of the Utilization Section, on 19th January, both at the Café Royal.

Ordinary Meetings

7th October: Inaugural Address as President, by J. Eccles. 4th November: "A Transatlantic Telephone Cable," by Dr. M. J. Kelly, Sir Gordon Radley, G. W. Gilman and R. J. Halsey. 2nd December: "The Electrification of the Manchester – Sheffield – Wath Lines, Eastern and London Midland Regions, British Railways," by J. A. Broughall and K. J. Cook. 6th January: "Problems of Hydro-Electric Design in Mixed Thermal-Hydro-Electric Systems," by T. G. N. Haldane and P. L. Blackstone (Supply Section paper). (Joint meeting with the Institution of Civil Engineers.)

Informal Meetings

18th October: Discussion on "Electricity in the Future," opened by the President. 15th November: Discussion on "Has Nuclear Fission a Future as a Source of Industrial Power?" opened by Sir Harold Roxbee Cox. 6th December: Discussion on "The Applications and Limitations of Electronic and other Computers," opened by Dr. L. G. Brazier. 10th January: Discussion on "Atmospheric Pollution," opened by G. R. Peterson.

Education Discussion Circle

12th October: Discussion on "The Teaching of the Subject of Electromagnetism," opened by Dr. K. J. R. Wilkinson. 8th November: Discussion on "Methods of Teaching Technical Writing," opened by G. Parr. 8th December: Discussion on "Kinetic Theory of Gases for Engineering Students," opened by Dr. M. R. Gavin. (Joint meeting with the Education Groups of the Institution of Mechanical Engineers and the Institute of Physics.) 19th January: Discussion on "Education and Training for Engineers and Craftsmen in France," opened by R. G. Bellamy.

Radio Section

13th October: Chairman's Address, by C. W. Oatley. 25th October: Discussion on "Whether Compatibility is Necessary for a Colour Television System in Great Britain," opened by E. P. Wethey. 22nd November: Informal lecture on "Plastics for the Radio Engineer." 1st December: "The Vertical Radiation Patterns of Medium-Wave Broadcasting Aerials," by H. Page and G. D. Monteath. 13th December: Discussion on "Practical and Economic Problems in the Maintenance of Domestic Television Receivers," opened by W. L. Greenwood. 12th January: "Thermionic Valves of Improved Quality for Government and Industrial Purposes," by E. G. Rowe, P. Welch and W. W. Wright. 24th January: Informal lecture on "Radio Aids to Marine Navigation," by Captain F. J. Wylie.

Measurements Section

19th October: Chairman's Address by M. Whitehead. 2nd November: Discussion on "Boreholes—Instrumentation for Measurements at Depth," opened by P. Threadgold. 9th November: Section dinner (Café Royal). 23rd November: "The Application of the Hall Effect in a Semi-Conductor to the Measurement of Power in an Electromagnetic Field," by Prof. H E. M. Barlow. "Audio-Frequency Power Measurements by Dynamometer Wattmeters," by Dr. A. H. M. Arnold. 30th November: Discussion on "The Servicing of Electronic Measuring Instruments and its Effect on their Design," opened by Dr. Denis Taylor. 14th December: "An Attracted-Disc Absolute Voltmeter," by G. W. Bowdler. "The Use of an Electron Velocity Analyser to Stabilize a 50 kV d.c. Voltage Source to a few Parts in a Million," by M. E. Haine and M. W. Jervis. "A Precision Direct-Current Stabilizer," by M. W. Jervis. 18th January: Discussion on "The Human Operator in Closed Loop Control Systems," opened by Prof. C. Holt Smith.

Supply Section

27th October: Chairman's Address by J. D. Peattie. 24th November: "Supervisory Equipment for the Indication of Shaft Distortion in Steam Turbines," by D. Antrich, H. W. B. Gardiner and R. K. Hilton. "The Electrical Measurement of Steam-Turbine Rotor Movements, with special reference to the Operation and Design of Modern Power Plant," by J. L. Ashworth, J. S. Hall and A. H. Gray. (Joint meeting with the Steam Group of the Institution of Mechanical Engineers.) 15th December: "Short-Circuit Forces on Turbo-Alternator End Windings," by J. B. Young and D. H. Tompsett. 5th January: "The Economic Selection of Cooling Towers for Generating Stations," by G. F. Kennedy and P. H. Margen. "The Application of Friction-Heat Transfer Correlations to Cooling-Tower Design," by P. H. Margen. 26th January: "Sealed Transformers," by E. B. Franklin.

Utilization Section

21st October: Chairman's Address, by J. I. Bernard. 18th November: "The Use of Electricity in the Production of Calcium Carbide," by C. J. Beavis. 9th December: "A Brushless Variable-Speed Induction Motor," by Prof. F. C. Williams and E. R. Laithwaite. 19th January: Section dinner-dance (Café Royal). 20th January: "Design, Performance and Application of Miniature Circuit-Breakers," by H. W. Wolff and T. G. F. Atherton.

Joint Meetings

Radio and Measurements Sections. 10th November: "Standard Frequency Transmissions," by Dr. L. Essen. "The Standard Frequency Monitor at the National Physical Laboratory," by J. McA. Steele. "Standard Frequency Transmission Equipment at Rugby Radio Station," by H. B. Law. 4th January: "Equipment of Instrumental Accuracy for Recording and Reproduction of Electrical Signals using Cinematographic Film," by H. McGregor Ross.

Extra Meetings

11th November: "The Overhaul and Maintenance of d.c. Traction Motors," by J. G. Bruce.

NEXT WEEK'S EVENTS

Monday, 27th September

BOURNEMOUTH.—Grand Hotel, 8.15 p.m. A.S.E.E. Bournemouth Branch. "Electrical Control Gear for Mechanical Handling Plant," by S. H. Harding.

SCOTLAND.—Electrical Wholesalers' Federation. Conference in Scotland at the invitation of Scottish members.

Tuesday, 28th September

GLASGOW.—425, Sauchiehall Street, 7 p.m. Institution of Heating and Ventilating Engineers, Scottish Branch. "Welding as it affects the Heating Industry."

LONDON.—85, Minories, 5.30 p.m. Institute of Marine Engineers. Presidential Address by H. A. J. Silley.

Wednesday, 29th September

GLASGOW.—Marlborough House, Langside Avenue. Incorporated Plant Engineers, Glasgow Branch. Ladies' night.

LONDON.—School of Hygiene and Tropical Medicine, Keppel Street, Gower Street, 6.30 p.m. British Institution of Radio Engineers, London Section. "Computing Circuits in Flight Simulators," by Dr. A. E. Cutler.

Thursday, 30th September

LONDON.—Caxton Hall, 6 p.m. Engineers' Guild, Metropolitan Branch. Annual general meeting.

SHEFFIELD.—Grand Hotel, 7.30 p.m. Incorporated Plant Engineers, Sheffield and District Branch. Brains Trust, "Fuel Conservation." Chairman, Sir Oliver Lyle.

Friday, 1st October

LIVERPOOL.—9, The Temple, 24, Dale Street, 7.30 p.m. A.S.E.E. Liverpool Branch. "Off Peak Space Heating," by C. J. Wheeler.

LONDON.—Park Lane Hotel, Piccadilly, W.1, 7 for 7.30 p.m. Electrical Trades' Commercial Travellers' Association. Annual ball.

WEMBLEY PARK.—Century Hotel, Forty Avenue, 8.15 p.m. A.S.E.E., North West London Branch. "Modern Electric Repair Shop Practice," by E. H. Hymas.

Saturday, 2nd October

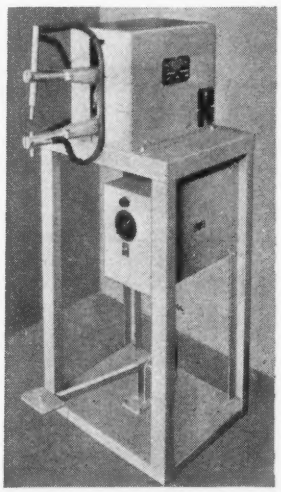
LONDON.—I.E.E. London Students' Section. Visit to Houses of Parliament at 10.30 a.m.

Empire Restaurant, Wilton Street, S.W.1, 7 for 7.30 p.m. Royal Engineers' Association, London Group. Dinner-dance.

NEW ELECTRICAL EQUIPMENT

Spot Welding Machine

A foot pedal operated spot welder, known as the P.S.8.B. has been introduced by MERITUS (BARNET), LTD., Wood Street, Barnet, Herts., to meet the demand for a compact bench type machine capable of welding thicker materials than can be handled by the normal bench type spot welder. The nominal output of the machine is 8 kVA and the maximum continuous welding capacity is 2 × 16in s.w.g. mild steel sheet, and 2 × ¼in diameter mild steel rod. The length of the welding arms is variable between 9 and 12in, but longer arms can be supplied if required. The welder is supplied complete with a "Meritus" electronic weld timer, a four-position heat switch and water cooling hose, and is mounted on a steel stand to form a compact easily transportable unit. Specially shaped electrodes for welding in awkward positions are also supplied with the machine as standard equipment.



Meritus foot operated spot welder

Electrostatic Detector

The a.c. "Voltector" made by HIVOLT, LTD., 34a, Pottery Lane, Portland Road, London, W.11, is a portable instrument designed to avoid the necessity of making physical contact with a conductor carrying a.c. power when checking whether it is alive or not. Essentially it records the presence of the electrostatic field which surrounds a live a.c. conductor, by a deflection of the meter. It cannot, therefore, be used if the conductor is totally enclosed in an earthed sheath. The instrument will operate on 50 V wiring or, at the other extreme, it will indicate from the ground whether a 132 kV overhead line is alive or dead.

One of its most important uses is for testing spouts in metal-clad switchgear. The instrument is presented to the mouth of the spout, the cross-member preventing it from penetrating the orifice. It will also indicate the exact position of a break or fault in a.c. line, provided that the line is not contained in an earthed sheath. The main instrument is supplied in a leather carrying case, weighs 2 lb and has an overall length of 16½in when the probe is attached.

Automatic Cooking Control

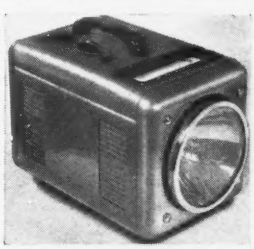
A new time control unit which can be pre-set to enable any existing make of electric cooker to operate automatically within 12 hours of setting, and then switch off after the desired cooking period, has just been marketed by METALFORM, LTD., 258, Grays Inn Road, London, W.C.1, and retails at £7 10s. It comprises an electric clock with a time-switch mechanism, and is housed in a stove-enamelled box supplied for either flush or surface mounting.

When not required the timing mechanism can be cut out and the cooker controlled in the usual way by the isolator switch fitted to the unit. A red signal lamp is illuminated when the cooker is in use. An additional feature is the provision of a 13 A shuttered socket outlet for an electric kettle or other appliance.

Industrial Stroboscope

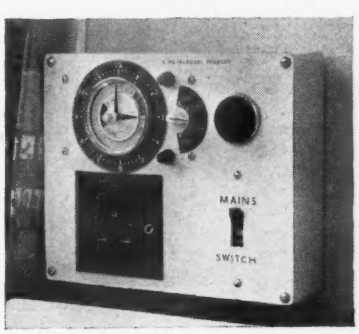
The new high-power industrial stroboscope made by E.M.I. ENGINEERING DEVELOPMENT, LTD., Hayes, Middlesex, is capable of visually arresting the motion of machinery so that it can be examined under white light of very high intensity. The grid-triggered gas-discharge lamp is coupled through a special circuit to a moving coil meter with an accuracy of 1 per cent of full-scale deflection. The 6in scale is calibrated in both r.p.m. and flash frequency, with a maximum of 100 flashes/sec, corresponding to 6,000 r.p.m. Speeds up to 48,000 r.p.m. or more can be satisfactorily measured by reading every second, third or fourth, etc., repetition image and multiplying the scale reading accordingly.

The lamp may be made to flash by the closing of a mechanically-operated contact, or from a 5 V sine-wave input or a 1 V positive pulse. A stable internal oscillator controls the lamp over the whole range of the instrument, and it is also possible to synchronize the oscillator with the mains, so that it will lock at multiples and sub-multiples of the mains frequency. The lamp may be used either housed in the body of the instrument or at the end of a 6ft flexible lead.



Above: E.M.I. high power industrial stroboscope

Below: Metalform automatic cooker control unit



Lighting Fitting

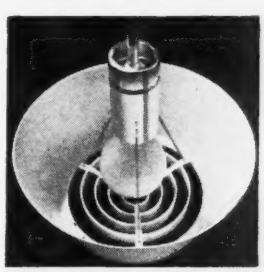
An inexpensive lighting fitting, the "Ventura 80," has been introduced by the MERCHANT ADVENTURERS, LTD., 43, Portland Road, London, W.11. It consists of a straight-sided louvred plastic diffuser 12in in diameter, suspended by three ball chains from a silver anodized lamp housing in which three alternative key-hole slots are incorporated so that a 100, 150 or 200 W lamp may be used. A small disc is provided to allow the whole assembly to be attached to any standard b.c. shade-ring lampholder.

The diffuser is moulded in a special high temperature grade of cellulose acetate, and the unit has been designed with a louvre which gives direct downward illumination within a cone of 90 deg; at the same time a cut-off angle operates hiding the lamp within all normal angles of vision. The top is open, giving shadowless ceiling lighting, and the white translucent sides provide diffused general illumination.

Although the fitting has been developed primarily for classrooms, it is likely that a much wider use will be found for it.

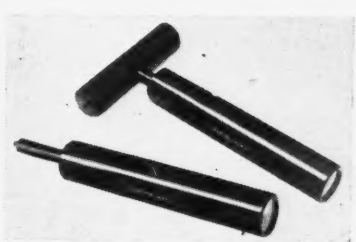
The retail price is £1 2s 8d plus 4s 3d purchase tax in the United Kingdom.

Other units available include tubular and flex suspension types and a ceiling design which measures only 10in overall.



Above: Merchant Adventurers' "Ventura 80" lighting fitting

Below: Hivolt "Voltectors," one with probe and the other with a cross member



Financial Section

STOCKS and SHARES

SOMEWHAT unsettled conditions have been prevailing in Stock Exchange markets. Normal investment business seems to have been restrained by the uncertainties attaching to international affairs. At the same time, speculation in some of the recently favoured stores and mining shares over-reached itself, and temporarily affected a wider area. Gains and losses have, however, been about evenly balanced in the industrial market, which, it may be noted, is generally agreed to have been extraordinarily free from speculative excesses throughout the steep rise of the past two years. Gilt-edged stocks are again virtually unchanged on the week.

Gains and Losses

Ericssons were one of the week's best features in the electrical equipment market, rising 2s 3d to a new peak of 28s 9d. International Combustion advanced further to 30s, and have now gained 5s since the declaration of the increased interim dividend. Babcocks were better in sympathy. Deccas came into renewed favour with a jump of 2s 9d, but other radio shares, including Pye and E.M.I., were inclined to be reactionary. Shares which improved further upon previous rises included Aberdare Cables, Dictograph, Holophane and Veritys. Among the shares which lost a part of former appreciation were Lucas, Parsons, Reyrolle, Aron, A.E.I., Thornycroft and Clarke Chapman. British Relay Wireless "A" 5s shares were standing at 21s 6d at the time of the final dividend declaration, which brings the total up to 16 per cent.

Chloride Electrical Storage

The shares of Chloride Electrical Storage are 2s 6d easier at 62s 6d. An interesting offer is to be made in the near future of rather more than £1½ million of its ordinary stock from the Electric Storage Battery Company of Philadelphia. This holding has been bought by the bankers, Lazard Bros. & Co., who will offer the shares to the public, and the stockholders of Chloride Electrical, at 63s free of stamp, per £1 stock. The "A" shares carry the voting power, the "B" shares vote only in the event of winding up. The prices of the "A" and "B" are the same: the repatriated shares are in the "A" class.

Morphy-Richards

Activity in Morphy-Richards 4s shares is associated also with the fact that results for the year ended last June are expected to be declared within a week or two. An indication of dividend prospects was given in a statement from the company at the time of a one-for-two scrip issue last March. Sales to that date were said to be showing a large increase over the previous year's figures, and in the absence of some unexpected reverse, the directors expected to be able to maintain, on the larger capital, a final distribution at the same rate as for the

The Week's Price Changes

Company or Board	Nom. Value	Middle price 20th Sept.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield %	1954 Highest	1954 Lowest
Gilt-edged Stocks						£ s d		
Brit. Elec. 1968/73	100	95⅛		3	3	3 2 10	97	88⅞
Brit. Elec. 1974/77	100	95		3	3	3 3 2	96⅛	87¼
Brit. Elec. 1976/79	100	101⅛		3⅛	3⅛	3 9 0	101⅛	93 8/16
Brit. Elec. 1974/79	100	109		4¼	4¼	3 18 0	111⅛	103 8/16
Overseas Electric Supply								
Calcutta Elec.	£1	24/-		6†	6†	5 0 0†	24/6	18/7
East African Power	£1	22/-		7	7	6 7 3	23/4	19/6
Nigerian Elec.	£1	24/-		10	10	8 6 8	25/-	23/6
Palestine Elec. "A"	£1	21/-		Nil	Nil	—	21/-	16/-
Perak Hydro-Elec.	£1	14/9		Nil	6	8 2 8	16/-	13/9
Equipment and Manufacturing								
Aberdare Cables	5/-	13/-	+6d	25	12½†	4 16 3	13/-	8/1
Aerialite	1/-	13/9		88⅛	88⅜	6 8 6	14/-	10/9
Allen, W. H.	£1	76/3		15	20	5 5 0	76/3	50/-
Aron Elec. Ord.	£1	52/6	−1/3	20	15	5 14 3	53/9	43/-
Assoc. Elec. Ord.	£1	57/6	−3/3	20	11¼*	3 16 6	61/6	41/6
Automatic Tel. & El.	£1	72/6		15	15	—	73/-	57/3
Babcock & Wilcox	£1	63/9	+1/3	18	12*	3 15 3	63/9	47/3
Baldwin, H. J.	2/-	4/6		20	20	8 18 0	5/6	3/9
Bakelite	10/-	26/3		12½	12½	4 15 3	27/6	23/6
British Aluminium	£1	37/6	+1/9	12	10	5 6 8	40/-	33/9
B.I. Callender's	£1	47/-	−6d	10	10	4 7 0	48/-	37/9
B.I. Callender's 6% Pref.	£1	26/3	−3d	6	6	4 11 6	26/6	24/3
British Thermostat	5/-	26/3		35	27½*	—	26/3	12/-
British Vac. Cleaner	5/-	13/6		25	25	9 5 3	14/6	11/6
Brook Motors	10/-	50/-		20	20*	4 0 0	50/-	33/3
Brush Ord.	5/-	7/6	+6d	4	6	4 0 0	7/6	3/6
Bulgin, A. F.	1/-	3/6		30	30	8 11 6	3/7	3/2
Burco	5/-	17/6		35	35	5 0 0*	17/6	12/1
Chloride El. Storage	£1	62/6	−2/6	20	12½*	4 0 2	68/-	46/6
Clarke Chapman	£1	70/-	−2/6	17½	20	—	73/-	47/6
Cole, E. K.	5/-	31/3	−2/6	25	27½	—	38/9	22/6
Cossor, A. C.	5/-	9/6		10	10	5 5 3	11/-	7/-
Crabtree	10/-	28/9		17½	17	6 1 9	29/6	23/9
Crompton Parkinson Ord.	5/-	19/-	−6d	11¼	20	5 5 3	19/6	14/-
De La Rue	5/-	18/9	−3d	Nil	20	5 6 8	21/-	12 3
Decca	4/-	46/-	+2/9	150	35	—	46/-	32/-
Desoutter	5/-	22/6		18	20	4 9 0	22/6	16/1
Dewhurst	2/-	7/-		19	19	5 8 6	6/6	5/1
Dictograph Tel.	2/-	8/-	+1/-	20	20*	5 0 0	8/-	5/2
Dubilier Condenser	1/-	4/6xc		25	25	—	5/3	3/3
E.M.I.	10/-	22/-	−1/-	12	8	3 12 9	23/-	11/3
Electrical Components	5/-	16/3	+1/3	20	20	6 3 0	16/3	10/9
Elec. Construction	£1	62/-		15	15	4 16 0	62/6	53/-
Enfield Cable Ord.	£1	23/9	−2/-	5	Nil	Nil	25/9	16/6
English Electric	£1	58/9		15	10*	3 8 0	59/-	38/-
English Electric 3¾% Pref.	£1	16/9		3¾	3¾	4 9 7	16/9	15/3
Ericsson Tel.	5/-	28/9	+2/3	22†	25†	2 3 6*†	28/9	22/9
Ever Ready	5/-	25/3	−9d	35	40	—	26/3	17/9
Falk Stadelmann	£1	40/-		15	15	7 10 0	41/-	36/6
G.E.C. Ord.	£1	50/-	−2/-	11¼	12½	5 0 0	53/-	37/6
G.E.C. 6½% Pref.	£1	27/-		6½	6½	4 16 3	27/3	26/6
General Cables	5/-	17/3		30	30	8 14 0	17/3	16/3
Greenwood & Batley	£1	51/3		17½	17½	6 16 6	51/3	40/3
Hackbridge Cable	5/-	14/6	−9d	20	20	6 18 0	15/9	11/3
Hackbridge & Hewittic	5/-	22/6		20	25	5 11 0	23/3	16/10
Hall Tel. Acc.	10/-	13/-		10	10	7 13 10	13/-	10/6
Heatrae	2/-	5/6	+6d	12½	12½	4 11 0	5/6	4/-
Henley's	10/-	20/3		10½	10½	5 7 0	20/3	15/6
Holophane	5/-	17/6	+9d	20	20	5 14 3	17/6	13/1

* After capital bonus. † Free of income tax.

The above quotations are based upon middle prices in the Stock Exchange Daily Official List.

five preceding years, namely 25 per cent. The 15 per cent interim for the latest period was paid before the share issue, so that a 25 per cent final will not mean altogether certainly a 40 per cent total. Estimated tentatively on that basis, however, the yield may be calculated at nearly 7 per cent.

Dubilier Prospects

At last week's annual meeting, the deputy-chairman of Dubilier Condenser (Mr. F. H. McCrea) had under review a year in which smaller tax provisions largely offset a reduction in earnings, leaving little change in the net surplus of £113,000 available for the ordinary dividend and reserves. Of this, the dividend of 25 per cent absorbed only £24,000 net (considerably less, incidentally, than the amount charged to the excess profits levy alone), and another share distribution, this time of 25 per cent, is being made. Reviewing further prospects, Mr. McCrea thought that the steps being taken to meet intensified competition should result in a satisfactory outcome to the current year. The 1s shares are quoted at 4s 6d, ex the share distribution, allowing for which the prospective yield is close on 4½ per cent.

in Electrical Investments

Company or Board	Nom. Value	Middle price 20th Sept.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield %	1954 Highest	1954 Lowest
Equipment and Manufacturing—continued.						£ s d		
Hoover	5/-	46/3	−3/-	25	45	4 17 3	51/-	26/3
I.C.I.	£1	39/-	+9d	13	15	3 17 0	39/-	26/6
Ind. Combustion	5/-	30/-	+1/3	15	20	3 6 8	30/-	14/6
Johnson & Phillips	£1	51/3		15	15	5 17 0	52/6	47/6
Lancashire Dynamo	£1	58/-		12½	14	4 15 9	59/6	43/-
Laurence, Scott	5/-	22/6		15	20	4 9 0	25/-	14/-
Lister, R. A.	£1	32/6xc	—	9	12	—	32/9	22/6
London Elec. Wire	£1	51/3		15	10*	3 18 0	51/3	38/-
Lucas, J.	£1	38/9	−1/3	9⅛	10⅛	—	40/-	25/3
Marryat & Scott	2/-	7/9		22½	25	6 9 0	7/9	5/11
Mather & Platt	£1	47/6		12½	15	—	47/6	32/-
Metal Industries	£1	34/6	−3d	12	9	5 4 3	42/3	29/6
Midland Elec. Mfg.	£1	67/6		15	15	4 9 0	67/6	63/-
Morphy-Richards	4/-	24/-	−6d	40	40	—	25/-	11/4
Murex	£1	50/-	−6d	15	15	6 0 0	57/-	50/-
Newman Ind.	2/-	2/4½		10	10	8 8 5	2/6	2/-
Oldham & Son	1/-	3/3		17½	17½	5 7 8	3/4	2/5
Parnall (Yate)	5/-	10/6		6	8	3 16 3	11/-	4/3
Parsons, C. A.	£1	55/-	−2/6	12½*	7½*	2 14 6	60/-	38/1
Plessey	10/-	56/3	−2/6	25	30	—	58/9	37/10
Pye Deferred	5/-	30/-	−1/9	20	20*	3 6 8	32/6	15/7
Revo	10/-	14/-		27½	9*	6 8 6	20/3	14/-
Reyrolle	£1	85/-	−2/6	12½	13¾	3 4 9	92/6	66/-
Rheostatic	4/-	15/-	−9d	19	20	5 6 8	15/9	11/-
Richardsons Westgarth	5/-	11/9		15	15*	6 7 8	12/3	6/6
Scottish Cables	4/-	21/9		20	27½	5 1 3	21/3	12/11
Siemens Ord.	£1	38/-	−1/-	10	10	5 5 3	43/9	33/9
Smith (England), S.	4/-	13/9		12½	15	—	13/6	7/8
Southern Areas	£1	24/6	−6d	6	7½	6 2 6	27/6	17/6
Strand Elec.	5/-	9/3		17½	17½	9 9 3	9/3	8/3
Sturtevant	5/-	45/-		18·1†	18·9*†	2 2 0†	44/-	29/-
Sun Elec.	£1	32/6		15	15	9 4 8	32/6	27/6
Switchgear & Cowans	5/-	12/9		22½	10	3 18 6	13/7	9/9
Taylor Tunnicliff	5/-	11/-		25	12½*	5 13 9	12/4	10/7
T.C.C.	10/-	36/3		20	30*	—	36/3	21/3
T.C. & M.	£1	33/6		10	8½*	5 1 6	34/6	30/3
Telephone Mfg.	5/-	9/6		10	10	5 5 3	9/6	7/6
Thorn Elec.	5/-	26/-	−6d	12½	20	3 17 0	27/-	13/3
Thornycroft	£1	44/-	−3/-	15	15	6 16 4	47/6	33/4
Tube Investments...	£1	73/9	−1/3	15*	15	4 1 3	75/-	60/3
Vactric	5/-	17/-		Nil	10	2 18 9	18/9	7/6
Veritys	5/-	9/3	+6d	10	12½	6 15 2	9/3	5/-
Walsall Conduits	4/-	51/3		70	70	5 9 4	52/6	44/-
Ward & Goldstone	5/-	39/-	−6d	45	50	—	39/6	21/-
Watford	2/-	7/-		25	22½*	—	6/9	4/7
Westinghouse Brake	£1	76/3	−9d	14	15	3 19 0	77/-	60/9
West, Allen	5/-	16/6		15	17	5 6 1	16/6	12/7
Wolf Electric	5/-	16/3		15	17½	5 7 9	14/9	11/-
Trusts, Transport and Communications								
Anglo-Am. Tel.:								
A Ord.	100	86	+2½	—	6	6 19 6	89½	80
Ord.	100	54½		—	3	6 17 6	55½	52
Anglo-Portuguese	£1	24/3	+6d	8	8	6 12 0	24/3	21/-
Brit. Elec. Traction:								
Def. Ord.	5/-	62/6		35	50	4 0 0	63/9	39/1
Cable & Wireless:								
Ord.	£1	42/6		8	9	4 4 9	49/6	26/2
4% Loan	100	98½		4	4½	4 1 3	98½	95½
Calcutta Trams	£1	21/6	−1/6	2½†	6†	5 11 6†	24/6	17/1
Cape Elec. Trams	£1	15/6	−1/-	5½	7	9 13 6	17/6	12/4
Marconi Marine	£1	32/6	−2/-	10	10	6 3 0	33/9	27/6
Oriental Tel. Ord.	£1	90/-		16	16	—	95/-	82/6
Telephone Props.	£1	5½		8	8	—	5½	4½
Telephone Rentals	5/-	10/-		1	10	—	10/6	9/-

Richardsons Westgarth

Last year Richardsons Westgarth & Co. paid in taxation 64 per cent of the trading profit of £1·1 million; a total of practically £2 million in all has been paid over the past four years. The chairman therefore spoke feelingly on the subject at the recent meeting, when he showed the limitations of the advantages accruing from the new investment allowances. Speaking of the outlook, he reported that on the marine side of the business orders on hand promise steady employment for two or three years, but that new orders are scarce. It is probably this latter factor which accounts for the quotation of the 5s shares (at 11s 9d) on a yield basis as good as 6·3 per cent. From other points of view, there is good earnings cover for the dividend, a strong balance-sheet, and evidence of continued success in the development of the land engineering activities.

Domestic Equipment

Stimulated by the relaxation of hire-purchase restrictions, investments in companies concerned with domestic electrical appliances (as well as with radio, of course) have lately advanced in popularity. There was a sharp reaction in some prices last week, but despite this, within the space of only the past quarter, for instance, Hoover 5s ordinary have risen from about 35s 9d to 46s 3d and the same company's "A" shares from 30s 3d to 51s. Dividends on these "A" shares, issued originally to executives and employees, are geared relatively highly to changes in earnings. For last year Hoovers paid dividends totalling 45 per cent on the ordinary capital, from earnings equivalent to 106 per cent.

F.A.S.S. Luncheon

The annual luncheon of the Federation of Associations of Specialists and Sub-Contractors is to take place at the May Fair Hotel, London, W.1, on 4th November. The principal guest will be the Minister of Housing and Local Government and it is hoped that the Minister of Works will also attend.

REPORTS and DIVIDENDS

Richardsons, Westgarth & Co., Ltd.—Mr. O. J. Philipson (chairman) presided at the annual meeting held on 15th September. In his statement, which had been previously circulated, the chairman said that the trading profit for the year under review constituted a record. The land engineering business had continued to expand. One of the company's large turbo-alternator sets — the 60 MW Richardsons Westgarth-Brown Boveri unit installed at Portobello power station, Edinburgh—headed the list of all United Kingdom generating installations both for thermal efficiency and for cost per kWh generated, whilst having the high load factor of 92 per cent. Within recent months, when amending the licence agreement with Brown, Boveri & Co., Ltd., of Baden, they were able to include the production of gas turbines, and this would enable them to enter this field. The current order book was still a heavy one, and the programme should provide steady occupation for the works for two or three years.

Berry's Electric, Ltd.—The annual meeting was held on 15th September, Mr. Raymond Berry (chairman) presiding. In his circulated statement Mr. Berry said that during the course of the year the recession which had affected the sale of electrical appliances came to an end, and since then they had experienced an unprecedented demand for their products. The export of "Magicoal" fires to forty-one countries, including the United States, increased by 25 per cent and they expected to double this rate of increase in the current year. Exports of switchgear, water heaters and lighting fittings had all increased in volume and in value. In this country the reductions in purchase tax and the removal of hire-purchase restrictions had stimulated the demand for their electric fires and water heaters to a level at present in excess of the maximum output.

Thorn Electrical Industries, Ltd.—The annual meeting was held on 17th September. Mr. Jules Thorn (chairman and managing director), in the course of his speech, said that progress during the year in the Atlas Lighting Division had been remarkable and substantial contracts had been received from the Government, public bodies, municipal authorities and large industrial users. The lighting subsidiaries continued to contribute to the company's prominent position in the lighting industry. In the export field distribution of its products continued to expand, particularly in the Commonwealth and "sterling" countries. Export sales had increased by approximately 40 per cent. Ferguson Radio & Television had another record year. During the autumn the benefit of the reorganization of the television factory began to make itself felt, but in the latter months of the year under review sales of television receivers were adversely affected by controversy about the provision of alternative programmes.

The Dubilier Condenser Co., Ltd.—Mr. F. H. McCrea, deputy chairman and managing director, presided at the annual meeting held on 15th September, and referred to the loss which the company had suffered through the sudden death that day of Mr. W. H. Goodman, the chairman.

The circulated statement of the chairman mentioned that the period of keener competitive trading referred to last year had materialized. The value of sales turnover was almost equal to that of the previous year, but to achieve this they had had to manufacture and sell a larger volume of products at reduced selling prices. A larger volume of orders was obtained from customers in the home market with the exception of Government orders, which were substantially less than in previous years. Export business was maintained notwithstanding severe competition and exchange difficulties, and they delivered large installations of capacitors overseas including some to the dollar earning territory. The extensions to the Acton and Kirkby factories were completed and as new plant was delivered it was being put into commission. The value of outstanding orders was less than it was a year ago. New designs of capacitors were being introduced and production methods were being continually improved.

E. K. Cole, Ltd.—The London & Yorkshire Trust, Ltd., announces, on behalf of E.K. Cole, Ltd., that the directors of that company, having received the consent of the Treasury, recommend the issue of 1,676,300 ordinary shares of 5s each, credited as fully paid up, by way of capitalization of reserves to ordinary stockholders, in the proportion of one new ordinary share for every ordinary stock unit of 5s held. The directors recommend the capitalization of £19,075, part of the amount standing to the credit of the profit and loss account, and the application of this sum, together with the share premium account of £400,000, resulting from the recent cash issue, in paying up the 1,676,300 new ordinary shares. An extraordinary general meeting to consider the proposal will be held on 19th October. The new shares will be converted on allotment into ordinary stock, which will rank *pari passu* in all respects with the existing ordinary stock and will, therefore, entitle the holders to receive all dividends which may be declared in respect of the current financial year, ending 31st March next. The doubling of the issued ordinary capital by the proposed capitalization of reserves should not be taken to indicate an increase in the total sum to be distributed by way of ordinary dividends in respect of that financial year.

The Nigerian Electricity Supply Corporation, Ltd.—The annual meeting was held on 21st September, Mr. G. Hemmant (chairman) presiding. In his circulated statement the chairman said that the sales of electricity during the year under review totalled 56·3 million kWh, as compared with 59·5 million in the preceding year. The reduction in sales was due largely to a prolonged 1952–53 dry season and its effect upon the water power reserves. The recently completed Jekko 2 power station would enable them to generate more power from the same water, and thus counteract the effects of a prolonged dry season. Power sales to smaller consumers showed a general increase, and bulk sales to the Electricity Corporation of Nigeria now represented 10 per cent of the total power sales.

The British Relay Wireless & Television, Ltd., reports a group trading profit for the year to 30th April last of £267,192, as compared with £218,248 for the preceding year, and after providing £177,716 for taxation, the net profit is £89,476 (against £38,580). It is proposed to pay a final dividend of 11 per cent on the "A" ordinary capital, making 16 per cent for the year. The balance carried forward is £45,440 (against £3,973 brought in).

James Howden & Co., Ltd., report a group profit for the year ended 30th April last of £804,283, as compared with £787,073 for the preceding year. Taxation absorbs £501,238, leaving a net balance of £303,045 (against £316,982). General reserve receives £100,000, and it is proposed to pay a final dividend on the doubled capital of 15 per cent. An interim dividend of 7½ per cent was paid on the capital before the 100 per cent scrip issue. For the previous year the total dividend on the smaller capital was 30 per cent. The balance carried forward is £62,289 (against £61,801 brought in).

Eveready South Africa, Ltd., reports a net profit for the year ended 30th June last of £85,373, as compared with £73,247 for 1952–53. It is proposed to pay a final dividend of 9d per share, making 25 per cent for the year. For the previous year a single payment of 25 per cent was made.

The Electric Construction Co., Ltd., proposes, subject to the consent of the Capital Issues Committee, to capitalize £462,315 of reserve and to distribute one new £1 ordinary share for every £1 of ordinary stock held.

The British Electric Traction Co., Ltd., announces that the consent of the Capital Issues Committee has been obtained to capitalization of part of the reserves for the scrip issue to holders of deferred and "A" deferred ordinary stock in the proportion of two 5s "A" deferred ordinary shares for every 5s unit of stock held.

Chloride Electrical Storage Co., Ltd.—The holding of the Electric Storage Battery Co., of Philadelphia, of £1,573,688 of "A" ordinary stock of the Chloride Electrical Storage Co. is being purchased by Lazard Bros. & Co. of London. It is proposed to offer the stock to the public and Chloride stockholders at 63s, free of stamp duty, per £1 unit.

Bennis Combustion, Ltd.—After charging £68,700 for taxation, the net profit for the past year is £71,416, as compared with £63,920 for the preceding year. The proposed final dividend is 10 per cent (against 7½ per cent), making 15 per cent for the year (12½ per cent).

Bankruptcies

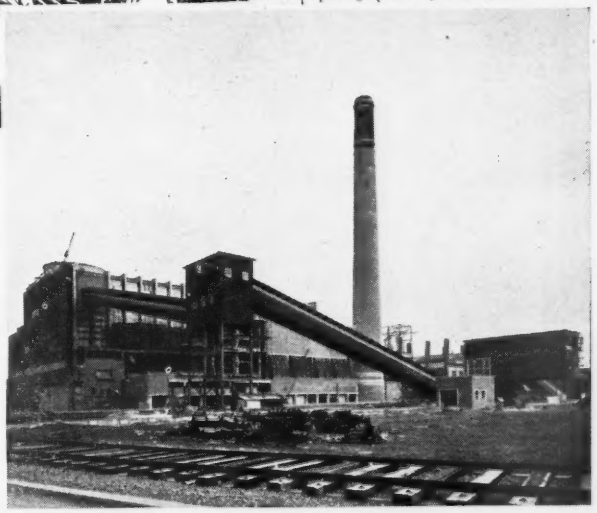
L. G. Sharp, 4, Summerley's Road, Princes Risborough, Bucks, electrician.—Trustee, Mr. J. H. Marshall, 55, North Street, Thame, Oxon, released 20th August.

H. W. Sharp, 178, Osmaston Road, Derby, trading as "Willdays," electrical and radio engineer.—Trustee, Mr. A. W. Hunter, Walter House, 418–422, Strand, London, W.C.2, released 20th August.

G. P. Woolley, "Wing Cottage," 28, Queen Street, Southminster, Essex, electrician.—Last day for receiving proofs for dividend 1st October. Trustee, Mr. W. J. W. Hill, 58–61, York Terrace, Regents Park, London, N.W.1, Official Receiver.

W. H. T. Mason, Castle Street, Mere, Wilts, trading as W. H. Mason & Son, electrical engineer.—Receiving order made 9th September on debtor's own petition.

The first of seven 360,000 lb/hr boilers which are being installed by Simon-Carves at the Chadderton (Oldham) Power Station for the North Western Division of the B.E.A. has now been commissioned. Steam conditions are 950 p.s.i. and 925° F. and the boilers are fired by pulverised fuel. The coal, ash and dust handling plants, the electro-precipitators, the water treatment plant and some of the civil engineering work are all included in the Simon-Carves contract at this station.



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NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s 8d each including postage) will be obtainable after 3rd November from the Patent Office, 25, Southampton Buildings, London, WC.2.

1950

7010. Compagnie des Freins & Signaux Westinghouse.—Wide-band amplifiers using semi-conductor crystals. 21st March, 1950. (717961.)

26551. British Thomson-Houston Co., Ltd.—Magnetic amplifier control systems. 1st October, 1950. (717905.)

1951

868. National Research Development Corporation.—Electron-discharge devices. 11th January, 1952. (717826.)

4450. Bader, K. E.—Electric heaters for line composing and casting machines and the like. 20th February, 1952. (717829.)

4549. Wireohms, Ltd., and Gore, J. T.—Heating elements for electric fires and the like. 26th May, 1952. (717911.)

5581. Brooke, B. N.—A.c. motor or generator. 18th February, 1952. (717830.)

6261. Ekco Products Co.—Method of forming a heat absorbing tin oxide structure on a tin article. 15th March, 1951. (717912.)

13057. Siemens Bros. & Co., Ltd.—Automatic telephone and like selective systems. 30th May, 1952. (717681.)

15875. British Thomson-Houston Co., Ltd.—Ignition systems. 4th July, 1951. (717755.)

17675. British Telecommunications Research, Ltd.—Telephone or like systems. 10th July, 1952. (717687.) 17676. Electrical signalling systems. 10th July, 1952. Cognate application 17677, 25th July, 1951. (717688.) 17678. Electrical signalling systems particularly telephone or like systems. 10th July, 1952. (717689.) 17679. Automatic telephone and like systems. 10th July, 1952. (717690.)

21378. Gregg Electrical Industries, Ltd., and Gregg, W. G. D.—Electric switch mountings. 29th November, 1951. (717919.)

21734 and 21736. Santon, Ltd.—Rotary electric switches. 16th December, 1952. (717924/5.)

23270. Marconi's Wireless Telegraph Co., Ltd.—Flying-spot pull-down film television scanners. 4th September, 1952. (717759.)

26062. National Research Development Corporation.—Thermionic valve cathode follower circuits. 13th January, 1953. (717931.)

26711. Smith Meters, Ltd., and Angold, H. E.—Electricity prepayment meters. 14th November, 1952. (717764.)

29609/10. British Thomson-Houston Co., Ltd.—Lamp base filling machines. 18th December, 1951. (717940/1.)

1952

291. General Electric Co., Ltd.—Equipment for measuring the thickness of thin non-magnetizable sheet material. 1st April, 1953. Addition to 671227. (717768.)

1158. Goldstaub, H. H.—Electric lamp circuit arrangements. 2nd April, 1953. (717772.)

1405. General Electric Co., Ltd., and Buckle, G. W. V.—Accessories for electrical measuring instruments. 16th February, 1953. (717707.)

1799. Busch - Jaeger Lüdenscheider Metallwerke Akt.-Ges.—Holders for fluorescent electric lamps. 22nd January, 1952. (717963.)

4476. Gilfillan Bros., Inc.—Pulse radar systems for moving target indication. 20th February, 1952. (717714.)

4498. General Electric Co., Ltd., and Varney, K. H.—Apparatus including a photo-electric cell. 4th February, 1953. (717860.)

4630. Metropolitan-Vickers Electrical Co., Ltd.—Magnetometers. 27th January, 1953. (717774.)

6386. Standard Telephones & Cables, Ltd.—Filtration systems. 12th March, 1952. (717779.)

7146. Vickers-Armstrongs, Ltd.—Triggering arrangements for electrical scale-of-two counter circuits. 11th February, 1953. (717780.)

8885. Compagnie des Machines Bull.—Addition and subtraction operating device for electric calculating machines operating in the binary system. 7th April, 1952. (717869.)

10204. Allis-Chalmers Manufacturing Co.—Clamping means for electromagnetic core. 23rd April, 1952. (717871)

11697. Ultra Electric, Ltd.—Radiolocation. 6th February, 1953. Cognate applications 25698, 14th October, 1952, 28809, 14th November, 1952, and 28810, 14th November, 1952. (717721.)

12035. National Research Development Corporation.—Electric circuit arrangements for affording a stable voltage or current. 19th May, 1953. (717981.)

13001. British Thomson-Houston Co., Ltd.—Methods of and apparatus for cutting crystal. 19th May, 1953. (717874.)

14126. Süddeutsche Kabelwerke Zweigniederlassung der Vereingte Deutsche Metallwerke Akt.-Ges.—Electrical insulating tape for wires and cables. 4th June, 1952. (717790.)

14743. Amalgamated Wireless (Australasia), Ltd.—Automatic gain control arrangement for pulse signalling systems. 11th June, 1952. (717983.)

15099. Adamson, R. A.—Electrically heated soldering irons. 16th June, 1953. (717986.)

15143. Mechanical Products, Inc.—Overload protected electric switches. 16th June, 1952. (717881.)

15384. Busch - Jaeger Lüdenscheider Metallwerke Akt.-Ges.—Arrangement of rotary electric switches in electric cooking range. 18th June, 1952. (717987.)

18096. Sperry Products, Inc.—Measuring devices particularly for ultrasonic resonance testing. 17th July, 1952. (717793.)

18278. Westinghouse Electric International Co.—Radar systems. 18th July, 1952. (717794.)

19438. Krautkrämer, J., and Krautkrämer, H.—Test head for ultrasonic testing. 31st July, 1952. (717795.)

19523. Philips Electrical Industries, Ltd.—Circuits for use in automatic signalling systems. 1st August, 1952. (717996.)

19862. Smit & Co.'s Transformatorenfabriek N.V., W.—Laminated magnetic core structures. 6th August, 1952. (717997.)

20032. Electric Storage Battery Co.—Electric storage batteries. 8th August, 1952. (717796.)

20583. Creed & Co., Ltd.—Electric motor speed regulation. 15th August, 1952. (717726.)

21039. Radio Corporation of America.—Colour television. 21st August, 1952. (717887.)

22262. Geigy Akt.-Ges., J. R.—Fluorescent monotriazole compounds and their use. 4th September, 1952. (717889.)

22722. Sontheimer, C. G.—Automatic control of energy transfer from an electrical source to a load. 10th September, 1952. (717728.)

23435. Nettle Accessories, Ltd., and Revington, D.—Electric lampholders. 13th August, 1953. Cognate application 29, 1st January, 1953. (718002.)

24036. Roe & Co., Ltd., A. V.—Electrical terminal blocks. 7th August, 1953. (718003.)

25649. Arthur, E. M.—Means for holding electric cable or piping in a coiled condition. 7th December, 1953. (717809.)

27071. British Thomson-Houston Co., Ltd.—Crack-off devices for removing excess exhaust tube from lamps, radio tubes and the like. 28th October, 1952. (718005.)

27733. Moses, N. K.—Electrically insulating traction rail joint liner. 4th November, 1952. (718009.)

29603. National Cash Register Co.—Electrical impulse generator. 24th November, 1952. (717952.)

30354. Electric Storage Battery Co.—Electric storage battery separators. 1st December, 1952. (717814.)

30714. Compagnie Générale de Télégraphie sans Fil.—Electrical condensers. 3rd December, 1952. (717731.)

30788. General Electric Co.—Fluid-flow measuring instruments. 4th December, 1952. (717897.)

1953

27098. British Thomson-Houston Co., Ltd.—Calcium phosphate phosphors. 18th October, 1951. Divided out of 717761. (717820.)

1954

2289 and 2291/3. British Telecommunications Research, Ltd.—Electrical signalling systems. 10th July, 1952. Cognate application 2290, 25th July, 1951. Divided out of 717688. (717734/6.) 2295. Electrical signalling systems particularly telephone or like systems. 10th July, 1952. Divided out of 717688. (717737.) 2296/7. Electrical signalling systems particularly telephone or like systems. 10th July, 1952. Divided out of 717689. (717738/9.)

5626. British Telecommunications Research, Ltd.—Telephone or like systems. 10th July, 1952. Divided out of 717687. (717740.)

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GENERATION AND DEVELOPMENT

Increased Output

In August the rate of increase in electricity generated was again unusually large for a summer month. As shown in the accompanying Table I, 5,028 million kWh was generated by the British Electricity Authority and the North of Scotland Hydro-Electric Board, a rise of 637 million kWh (14·5 per cent) compared with August, 1953. This makes the average increase for the eight months of the year 11·1 per cent, a figure which may be compared with the 5·7 per cent increase over the whole of last year.

New plant installed in B.E.A. stations last month included a 30 MW B.T.H. set at Walsall, a 550,000 lb/hr International Combustion boiler at Ince and a 180,000 lb/hr John Thompson boiler at East Yelland.

In Table II details are given of the Boards' sales during August. The national figures show an increase over August, 1953, of 14·6 per cent, but when corrected for weather conditions which were much colder than a year earlier, the increase is 9·3 per cent.

Recent B.E.A. Contracts

Contracts have been placed by the British Electricity Authority during the past few weeks for power stations, transforming stations, and transmission lines amounting in the aggregate to £19,575,572. They include the following:—

Littlebrook "C" power station, Dartford: High pressure pipework and valves.—C. A. Parsons & Co.

Portishead "B", near Bristol: Two brick chimneys.—Chimneys, Ltd.

Goldington, Bedford: One 300,000 lb/hr boiler.—Clarke, Chapman & Co.

South Denes, Yarmouth: Coal unloading plant.—Mitchell Engineering. Coal elevating and conveying plant.—International Combustion.

Castle Donington, near Derby: Subsidiary buildings.—Taylor Woodrow Construction. One 106 MVA, 275 kV transformer.—Metropolitan-Vickers Electrical Co.

Drakelow "A", Burton-on-Trent: Two 515,000 lb/hr boilers.—International Combustion.

Drakelow "B": One 120,000 kW turbo-generator, condensing, feed heating and evaporating plants.—C. A. Parsons & Co.

Willington "A", near Derby: Structural steelwork.—Edward Wood & Co. Coal handling plant.—The New Conveyor Co.

Hams Hall "C", near Birmingham: Three 60,000 kW turbo-generators.—General Electric Co. Condensing and feed heating plants for three turbo-generator sets.—Worthington-Simpson. Chimney and main flues.—D. Theaker & Co.

Bold "A", St. Helens: Superstructures.—John Laing & Son.

Bold "B": One 60,000 kW turbo-generator—General Electric Co. Condensing and feed heating plants for one 60,000 kW turbo-generator.—Hick Hargreaves & Co.

Connah's Quay, near Flint: Two 300,000 lb/hr boilers.—International Combustion. Two 30,000 kW turbo-generators, condensing and feed heating plants.—C. A. Parsons & Co. 3,300 V and 415 V auxiliary switchgear.—A. Reyrolle & Co.

Dolgarrog hydro-electric scheme, Caernarvonshire: Extension of catchment.—John Laing & Son, Ltd.

Elland, Yorks.: Site clearance, road and railway embankments, flood protection banks, access roads, etc.—Holland & Hannen & Cubitts.

Ferrybridge "B", Yorks.: Site clearance, road and railway embankments, flood protection banks, access roads, etc.—Holland & Hannen & Cubitts. Cooling tower.—Davenport Engineering Co.

Wakefield, Yorks.: Three 550,000 lb/hr boilers.—Foster Wheeler. Turbo-generator condensing plant.—Worthington-Simpson.

Carrington, near Manchester: Superstructure.—M. J. Gleeson (Contractors).

Chadderton, Oldham: Three 360,000 lb/hr boilers.—Simon-Carves.

Huncoat, Accrington: Condensing and feed heating plant for one 30,000 kW turbo-generator.—Hick Hargreaves & Co.

Portobello, Edinburgh: One 540,000 lb/hr boiler.—International Combustion.

Braehead, Renfrew: Internal and external painting.—Robert A. Thom & Co.

Dalmarnock, Glasgow: High pressure pipework and valves.—Stewarts & Lloyds.

Brighton (Fishergate) substation: 33 kV 730 MVA switchgear.—A. Reyrolle & Co.

Norwich substation: 33 kV 750 MVA switchgear.—A. Reyrolle & Co.

Stella West substation, Newcastle-upon-Tyne: 275 kV, 7,500 MVA switchgear.—A. Reyrolle & Co.

Yarmouth-Norwich and Ipswich-Yarmouth: 132 kV lines.—W. T. Henley's Telegraph Works Co.

Monk Fryston-Skelton Grange, Yorks.: 275 kV overhead line.—Balfour Beatty & Co.

TABLE I.—ELECTRICITY GENERATED AND PLANT INSTALLED*

	Fuel consumed Thousand tons			kWh generated Millions			kWh sent out Millions	Installed capacity (m.c.r.) MW
	Coal	Coke and Breeze	Oil	Steam	Water power	Total†		
British Electricity Authority ...	2,632	74	10·4	4,887	38	4,931	4,623	19,074
N. of Scotland H.E.B.	18	1	0·9	29	64	97	96	578
Total for August, 1954	2,650	75	11·3	4,916	102	5,028	4,719	19,652
Corres. total for August, 1953 ...	2,369	63	7·0	4,300	79	4,391	4,118	18,075
Increase or decrease, per cent ...	+11·9	+19·0	+61·4	+14·3	+29·1	+14·5	+14·6	+8·7
Total to date (8 months), 1954...	24,876	739	92·9	45,715	890	46,698	43,896	
Total for corres. 8 months of 1953	22,963	601	54·2	41,255	673	42,035	39,535	
Increase or decrease, per cent ...	+8·3	+23·0	+71·4	+10·8	+32·2	+11·1	+11·0	

* Comprising all generating stations controlled by the British Electricity Authority and the North of Scotland Hydro-Electric Board.

† Including 6 million kWh generated by oil engines and 4 million by waste heat plants in August, 1954.

TABLE II.—ELECTRICITY SENT OUT BY AREA BOARDS FOR THEIR CONSUMERS

Area Board	Totals for August (million kWh)			Twelve Months Totals Ended 31st August (million kWh)		
	1953	1954	Inc. or Dec. %	1953	1954	Inc. or Dec. %
London	333·6	376·6	+12·9	5,696·9	5,905·1	+ 3·7
South Eastern	215·3	238·8	+10·9	3,323·4	3,535·6	+ 6·4
Southern	255·3	291·3	+14·1	3,887·0	4,161·8	+ 7·1
South Western	127·9	160·8	+25·7	1,867·0	2,098·9	+12·4
Eastern	350·8	397·9	+13·4	5,394·8	5,736·2	+ 6·3
East Midlands*	302·4	346·0	+14·4	4,605·6	4,872·9	+ 5·8
Midlands*	378·7	441·9	+16·7	6,095·5	6,610·4	+ 8·4
South Wales*...	248·3	279·4	+12·5	3,366·3	3,798·5	+12·8
Merseyside and N. Wales* ...	241·8	279·8	+15·7	3,401·4	3,733·0	+ 9·7
Yorkshire*	397·9	460·1	+15·6	5,967·8	6,403·8	+ 7·3
North Eastern*	254·7	286·9	+12·6	3,582·2	3,810·7	+ 6·4
North Western*	470·9	531·7	+12·9	6,581·2	7,173·7	+ 9·0
South-East Scotland ...	90·9	103·5	+13·9	1,270·8	1,391·0	+ 9·5
South-West Scotland* ...	210·8	237·3	+12·6	3,077·1	3,290·8	+ 6·9
Total all Area Boards ...	3,879·3	4,432·0	+14·2	58,117·0	62,522·4	+ 7·6
Direct Supplies by Central Authority	82·9	107·8	+30·0	877·0	1,108·9	+26·4
Grand Total	3,962·2	4,539·8	+14·6	58,994·0	63,631·3	+ 7·9
Mainly Industrial Areas* ...	2,505·5	2,863·1	+14·3	36,677·1	39,693·8	+ 8·2
Mainly Non-Industrial Areas	1,373·8	1,568·9	+14·2	21,439·9	22,828·6	+ 6·5
Total Number of Effective Working Days	27·41	27·72				

* Those in which industrial consumers took over 50% of the total sales in the preceding financial year.

Connah's Quay Inauguration

When he opened the new power station at Connah's Quay last week Lord Citrine, chairman of the British Electricity Authority, said that while the shortage of power had not yet been completely overcome, substantial progress had been made to satisfy the growing demands of consumers. These now numbered about 14½ million of which some half million were added during the last year. Electricity sales had increased by nearly 60 per cent since April, 1948.

Some 43 new power stations had been commissioned in the last 6½ years and over 8½ million horse power had been added to the capacity of plant. Three of the new stations which had gone into commission were on Merseyside. It was planned to add a further 12 million h.p. of generating plant during the next six years. There was still a great way to go before British industry could place at the disposal of the worker as much electrical horse power as in the United States. In that country tremendous electrical expansion was going on and Great Britain could not afford to be behindhand.

It was necessary for us to use all the natural power resources at our disposal, whether coal or hydro-electric power. The B.E.A. was seeking powers from Parliament to promote hydro-electric schemes at Blaenau Festiniog and Rheidol in North Wales. Excluding Scotland, our hydro resources were limited almost entirely to North Wales where some

64,000 h.p. of hydro-electric plant was already harnessed to the system. The new hydro projects would provide 470,000 h.p. of additional capacity. In the design of these new schemes the most careful attention had been directed towards the preservation of local amenities.

In the article describing Connah's Quay generating station, which appeared in our last issue, Messrs. Mouchel & Partners were erroneously referred to as the civil engineering contractors for the station. They are the civil engineering consultants for the whole station and river intake works.

Support for Rheidol Scheme

The British Electricity Authority's revised Rheidol hydro-electric scheme which, with the proposed Festiniog pumped storage development, is to be the subject of a Parliamentary Bill in the forthcoming session, was explained to members of the Aberystwyth Borough Council at a recent meeting. After the proposals had been outlined by Mr. P. Briggs, deputy divisional controller, North West, Merseyside, who was accompanied by Mr. J. Warnock, hydro-electric engineer, the Mayor (Alderman E. W. Roberts) said: "I think I can say that we are wholeheartedly in favour of the scheme, subject to certain safeguards." Mr. Briggs said that the B.E.A, would open up the roads to the public and would do everything possible to beautify the area, so helping the tourist industry. Referring to the Festiniog scheme, he said that it would be the biggest of its kind in the country.

Donegal Hydro and Peat Schemes

Part of the civil constructional work for the Irish Electricity Supply Board's £700,000 hydro-electric scheme on the River Clady, at Gweedore, Co. Donegal, will begin shortly. As well as the hydro scheme, which will, it is estimated, produce about 12 million kWh annually, work will proceed during the next three years on a hand-won peat-fired station, also at Gweedore. Three other stations of this type have been planned for Kerry, Clare and Galway. The contract for part of the plant for the Gweedore station has been placed. The station's output will be 20 million kWh annually.

Objection to Ash Pumping

Blyth Town Council is objecting to the proposed system of ash disposal to be used by the British Electricity Authority when the new Blyth power station is built. The B.E.A. proposes to pump ash into the sea but the Town Council is concerned about the possible effect on the town's beaches. It is suggested as an alternative that ash should be taken by barge and dumped some miles out to sea.

Substation Accident

While carrying out minor extensions to the switchgear at the Yorkshire Electricity Board's substation in Dewsbury Road, Cleckheaton, last week, two electrical fitters employed by the British Thomson-Houston Co., Ltd., were severely burned by an explosion. The electricity supply to parts of the surrounding district was temporarily cut off.

Liverpool Lighting Conversion

Liverpool Lighting Committee has adopted a £600,000 programme for the conversion of the remaining 12,000 gas lamps in the city to electricity within 15 years. The scheme, which is subject to approval by the Finance and General Purposes Committee, provides for the installation of 15,000 street lamp positions at the rate of 1,000 a year. The city rates at present make provision for £20,000 per annum for conversion from gas to electricity and the Finance Committee is being asked to double this amount.

Rewiring Pre-War Houses

Barnet Council is applying for permission to borrow £2,260 for the rewiring of 87 pre-war houses.

Interchangeable Fluorescent Fittings

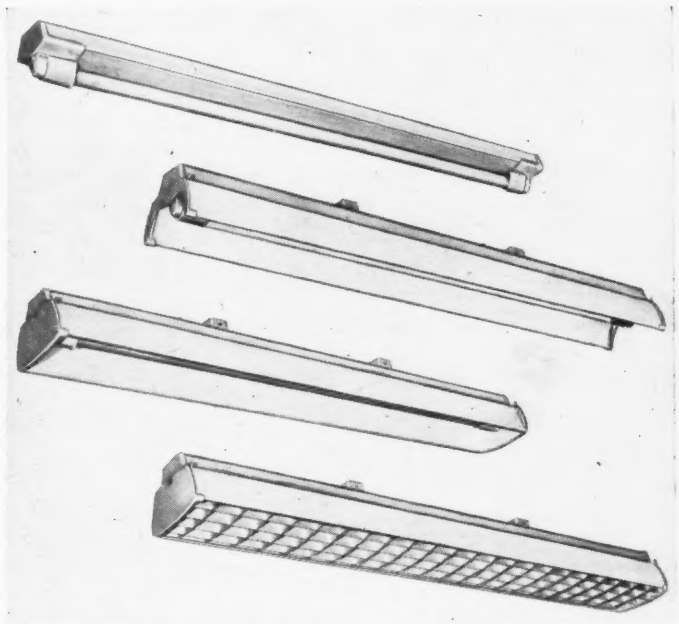
A NEW range of industrial fluorescent lighting fittings announced last week by Crompton Parkinson, Ltd., should provide the answer to the many lighting problems facing the factory lighting engineer. By using various combinations of ten basic component parts, it is possible to produce 54 different lighting fittings.

In developing these "New-Range" fittings Crompton Parkinson have made a comprehensive survey of users' needs and a study of modern building construction. The result is an attractive range incorporating many novel features to simplify installation and maintenance. Forming the foundation for the complete range are one-lamp and two-lamp general lighting fittings which can have base reflectors with either a "Permawhite" high-gloss stoved enamel finish or, for gritty atmospheres, a vitreous enamel finish. From these fittings, the range of reflector fittings is built up by the addition of light alloy die-cast end plates to which the side reflectors are attached. In this manner open or closed top effects are obtained, or translucent effects with opal diffusing "Perspex."

By dispensing with one side reflector the fittings automatically become suitable for the lighting of display shelves, wall charts, etc., while, with the full complement of reflectors or a single-side reflector, all the closed end fittings may be converted to louvre designs simply by attaching a rigid metal louvre having approximately 25/35 deg cut-off. Where louvres are not likely to be required open end reflector supports can be fitted in place of the end plates. Because of the complete interchangeability of parts, maintenance of the range of 54 designs can be achieved with a minimum stock of ten pieces.

To facilitate installation, built-in quick-fixing devices are provided for close ceiling mounting and infinitely variable fixing centres for ceiling or pendant mounting. Spring-loaded earthed cap contact lampholders with sliding end shields are fitted at both ends for simple lamp replacement from either end, or even from the centre of the fitting. Removal of the reflectors, even with the lamps in position, for cleaning purposes is simple and can be carried out with complete safety.

The finish includes complete "Bonderizing" of all enamelled steel parts and an automatically controlled process of stoving ensures uniformity. The fittings are constructed in accordance with B.S. 2467.



Top to bottom: Basic unit, basic unit with reflectors, basic unit with reflectors and closed ends, and basic unit with reflectors, closed ends and louvres

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Australia.—16th November. Split-cone, multi-range current transformers for Sydney County Council. (E.S.B. 22511/54. Ten/10782.)*

17th November. Induced draught fans for cooling towers for the State Electricity Commission of Queensland, Brisbane. (E.S.B. 22453/54. Ten/10762.)* Induced draught cooling towers. (E.S.B. 22451/54. Ten/10761.)*

Belgian Congo.—4th November. Ministry of Colonies, Brussels, and Government General in Leopoldville. Airfield electricity distribution equipment. (E.S.B. 22332/54. Ten/10738.)*

Carlisle.—2nd October. City Council. Electrical installations in a further batch of 200 houses. L. J. A. Stow, city engineer, 18, Fisher Street.

Formosa.—12th October. Taiwan Power Co., Taipei. Single-phase capacitors. (E.S.B. 22094/54. Ten/10711.)*

India.—18th October. Director General of Supplies and Disposals, New Delhi. Oil circuit breakers and ancillary equipment. (E.S.B. 22181/54. Ten/10731.)*

8th October. Government Electricity Department, Andhra. Distribution boxes. (E.S.B. 22276/54. Ten/10724.)* 15th October. Switches and fuses. (E.S.B. 22274/54. Ten/10726.)* 18th October. H.v. pin insulators, strain and suspension sets, etc. (E.S.B. 22491/54. Ten/10776.)* 20th October. 6·6 kV pin and shackle insulators. (E.S.B. 22492/54. Ten/10777.)* 22nd October. L.v. insulators. (E.S.B. 22493/54. Ten/10778.)*

Mirfield.—11th October. U.D.C. Installation of three electrically-driven pumps in connection with the reconstruction of Shepley Bridge sewage pumping station. Surveyor, Council Offices.

Morecambe and Heysham.—4th October. B.C. Electrical installations in 84 houses and flats at Branksome Drive and in four shops and eight flats at Trumacar Lane. Borough surveyor, Town Hall.

New Zealand.—3rd November. Director General (Stores Division), G.P.O., Wellington. Axial flow fans. (E.S.B. 21677/54. Ten/10722.)*

Newburn-on-Tyne.—2nd October. U.D.C. Electrical installations in 11 old people's bungalows and 32 houses on the West Denton Estate. J. A. Weatherley, surveyor.

Newcastle-on-Tyne.—20th October. City Council. Electrical installations in 68 flats and maisonnettes being built in Elswick Street. G. Kenyon, city architect, 18, Cloth Market.

Philippines.—20th October. Philippine Council for United States Aid, Manila. Equipment for agricultural training, including six generators with diesel engines, welders, battery chargers, electric grinders, etc. (E.S.B. 21235/54. Ten/10709.)* 6th October. Power conductors, ground wires, insulators, line hardware and accessories for the Ambuklao-Poro 69 kV transmission line. (E.S.B. 22187/54. Ten/10719.)*

Skelton and Brotton (Yorks).—6th October. U.D.C. Electrical fittings for 18 houses on the Coach Road Estate, Brotton Engineer and surveyor, Council offices, Skelton.

South Africa.—13th October. City Electrical Engineer, Cape Town. Fifty 750 kVA transformers and seven 300 kVA transformers. (E.S.B. 22017/54. Ten/10693.)*

21st October. Insulated steel staples for the Union Tender and Supplies Board, Pretoria. (E.S.B. 22460/54. Ten/10771.)*

Southern Rhodesia.—6th October. City Electricity Department, Bulawayo. Cables and accessories. (E.S.B. 22289/54. Ten/10728.)*

Tangier.—16th October. Secretariat des Travaux Publics d'Etat, Administration Internationale. Radio equipment. (E.S.B. 22072/54. Ten/10713.)*

United States.—5th October. Horn-gap disconnecting switches and disconnecting switches for the Bureau of Reclamation, Department of the Interior, Denver, Colorado. (E.S.B. 22607/54. Ten/10785.)*

7th October. 14·4 kV power circuit breakers for Missouri River Basin Project, South Dakota, for the Bureau of Reclamation. (E.S.B. 22250/54. Ten/10781.)*

Uruguay.—16th October. 3,000 dry rectifiers designed for telephone exchange switchboards. (E.S.B. 22536/54. Ten/10783.)*

21st October. Administration General de los Usinas Electricas y los Telefonos del Estado, Montevideo. Equipment for public lighting. (E.S.B. 22147/54. Ten/10716.)*

* Specifications may be inspected at the Export Services Branch, Board of Trade, Lacon House, Theobald's Road, London, W.C.1 (Chancery 4411; extension 769).

ORDERS PLACED

Alloa.—Corporation. Improvements to the street lighting at Alloa Road and Stirling Road, Tullibody (£1,933).—General Electric Co., Ltd.

Belfast. — Harbour Commissioners. Street lighting equipment for Belfast Harbour (£3,903).—Metropolitan-Vickers Electrical Co.

Gloucester.—City Council. Electrical installation at fire station, Eastern Avenue (£2,884).—W. T. Turner & Co.

London.—Battersea Borough Council. Electrical installations in 192 flats at Anerley Street housing scheme.—Alpha Manufacturing & Electrical Co.

Newcastle-on-Tyne.—Regional Hospital Board. Electrical installation at new X-ray department, Dryburn Hospital (£1,892).—North of England Engineering & Electrical Co.

Nottingham.—Sheffield Regional Hospital Board. Recommended. Re-wiring of wards and provision of individual bed lights at Harlow Wood Orthopaedic Hospital (£1,130).—Farrow & Pickford.

Seaton Valley.—U.D.C. Electrical installations in 140 houses at Seghill.—J. B. Wilson.

Electrical installations in 115 houses on the same estate.—W. Hinton.

Stockport.—Recommended. Electrical installations at St. Michael's (Nangreave Road) R.C. Secondary Modern School (£4,732) and installation works and the transfer of machinery at Hempshaw Lane annexe, Stockport College (£1,371).—Piggott & Whitfield. Electrical installations in 75 dwellings at Brinnington (£2,335).—Jones, Morris & Co.

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Birkenhead.—Factory, Vine Street, for Fusion Welding Construction Co., Ltd.; E. F. Blakeley & Co. (Liverpool), Ltd., Vauxhall Ironworks, Birkenhead.

Birmingham.—Factory, Lord Street; Aston Insulating Co., Ltd., 72, Lord Street, 7.

Blackburn.—New R.C. Church at Watson Street; Reynolds & Scott, architects, 9, Albert Square, Manchester.

Bournemouth.—Offices and showrooms Wimborne Road; Locomotors, Ltd., 706, Wimborne Road, Winton.

Brighton.—Three-storey flats (48), on Site B, Chelwood Close area; borough surveyor 26/30, King's Road.

Burnley.—Extensions at Colne Road for Platers & Stampers, Ltd.; Elliot Cox & Partners, architects, 172, Buckingham Palace Road, London, S.W.1.

Calne.—Houses (150), Lickhill Estate; Geo. Brown & Partners, architects, Brunel House, College Green, Bristol.

Cheam (Surrey).—Factory; Provincial Sheet Metal Works, Ltd., 299, Gander Green Lane, Cheam, Sutton.

Cheltenham.—Factory extensions; Douglas Equipment, Ltd., Kingsditch Lane.

Crawley.—Factory and offices proposed in Newton Road; J. Stone & Co. (Deptford), Ltd., engineers, Arklow Road, London, S.E.14.

Croydon.—Dwellings (97), Pawsons Road; borough engineer.

Factory, New Addington Estate; Butcher Bros., Ltd., 1, Theobald Road.

Gateshead.—Three blocks of eight-storey flats in Ann Street, East Street and at Wrekenton; G. Wimpey and Co., Ltd., contractors, Orchard House, Newcastle-on-Tyne.

Hull.—New pumping station at Haltemprice; city engineer, Guildhall.

London.—Office block, Old Jewry; Higgs & Hill, Ltd., builders, Crown Works, South Lambeth Road, S.W.8.

Welfare block and laboratory, Imperial Road, Fulham; Rush & Tompkins, Ltd., 109, Station Road, Sidcup.

Rebuilding premises; Tillett's Essex Sanitary Steam Laundry, Ltd., 134 Romford Road, E.15.

Morecambe.—Factory; G. C. Raymond & Co. Ltd., Westgate.

Newcastle-on-Tyne. — Factory, Fawdon Industrial Estate, for Scott and Turner, Ltd., chemical manufacturers (£1,000,000); R. Costain, Ltd., builders, 16, Great North Road, Newcastle.

Rebuilding of the Apollo Cinema, Shields Road, Byker, for Tyne Picture Houses, Ltd.; P. J. Stienlet and Son, architects, 4, Queens Square, Newcastle.

New Malden.—Library, Church Road, Worcester Park; borough engineer.

Plymouth.—Office block, New George Street; A. N. Coles, Ltd., Sutton Road.

Rotherham.—Factory extensions; Kenyon, Son and Craven, Ltd., Confectionery Works, Fitzwilliam Road.

Stevenage.—Factory for British Tabulating Machine Co., Ltd.; John Laing & Son, Ltd., builders, Bunns Lane, London, N.W.7.

Stockport.—Police and law buildings at John Street; G. Buillimore, architect, Lloyds Bank Chambers, Great Underbank, Stockport.

Library, Brinnington; Dobson Chapman & Partners, architects, Pear Tree House, Jordangate, Macclesfield.

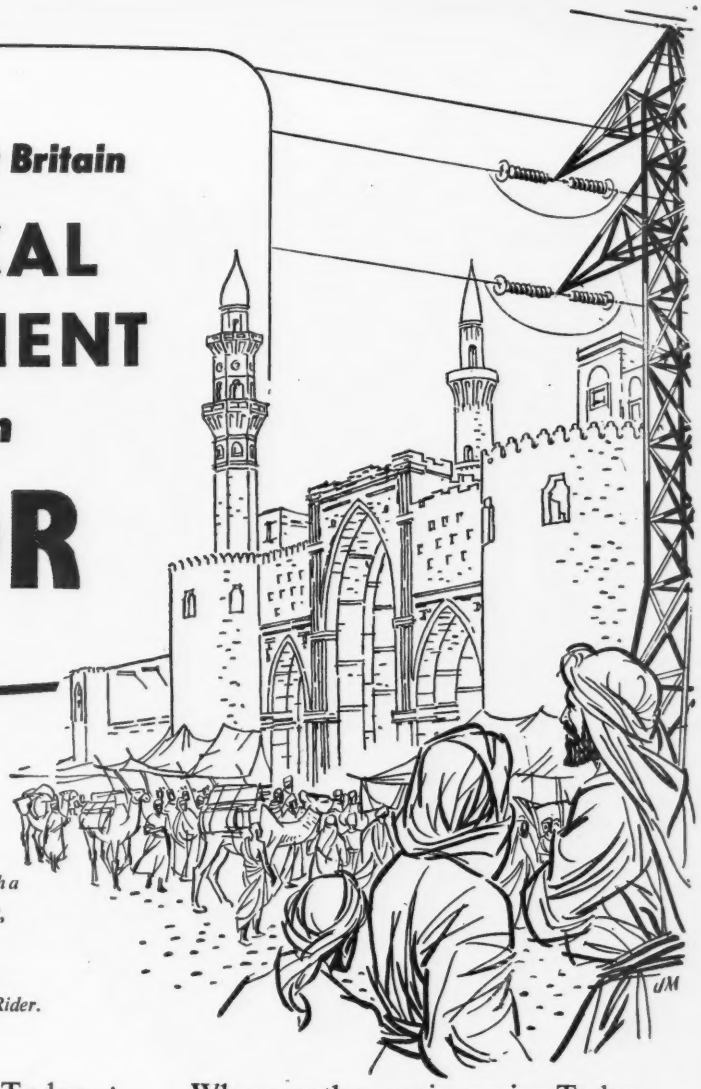
Stretford.—Reconstruction and extension of premises in Chester Road and Darwin Street; E. S. Bailey & Co., Ltd., chemists' sundriesmen, 1, Darwen Street, Trafford Park, Manchester, 16.

Sunderland. — Proposed Castle View Primary School; Martin and Felton, quantity surveyors, Lloyds Bank Chambers, Fawcett Street.

Works extensions; Hendon Paper Works, Ltd.

In Mecca as in Great Britain

ELECTRICAL DEVELOPMENT *depends on* TUDOR



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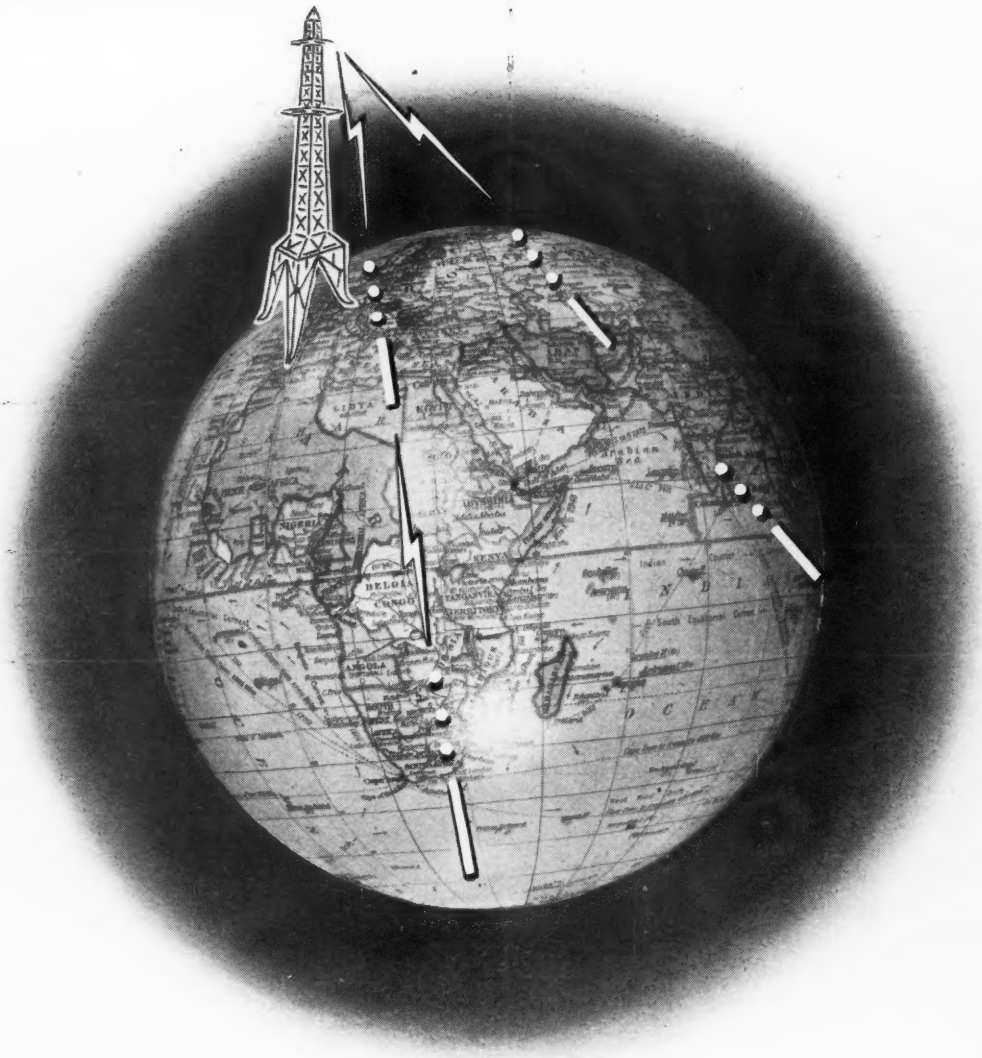

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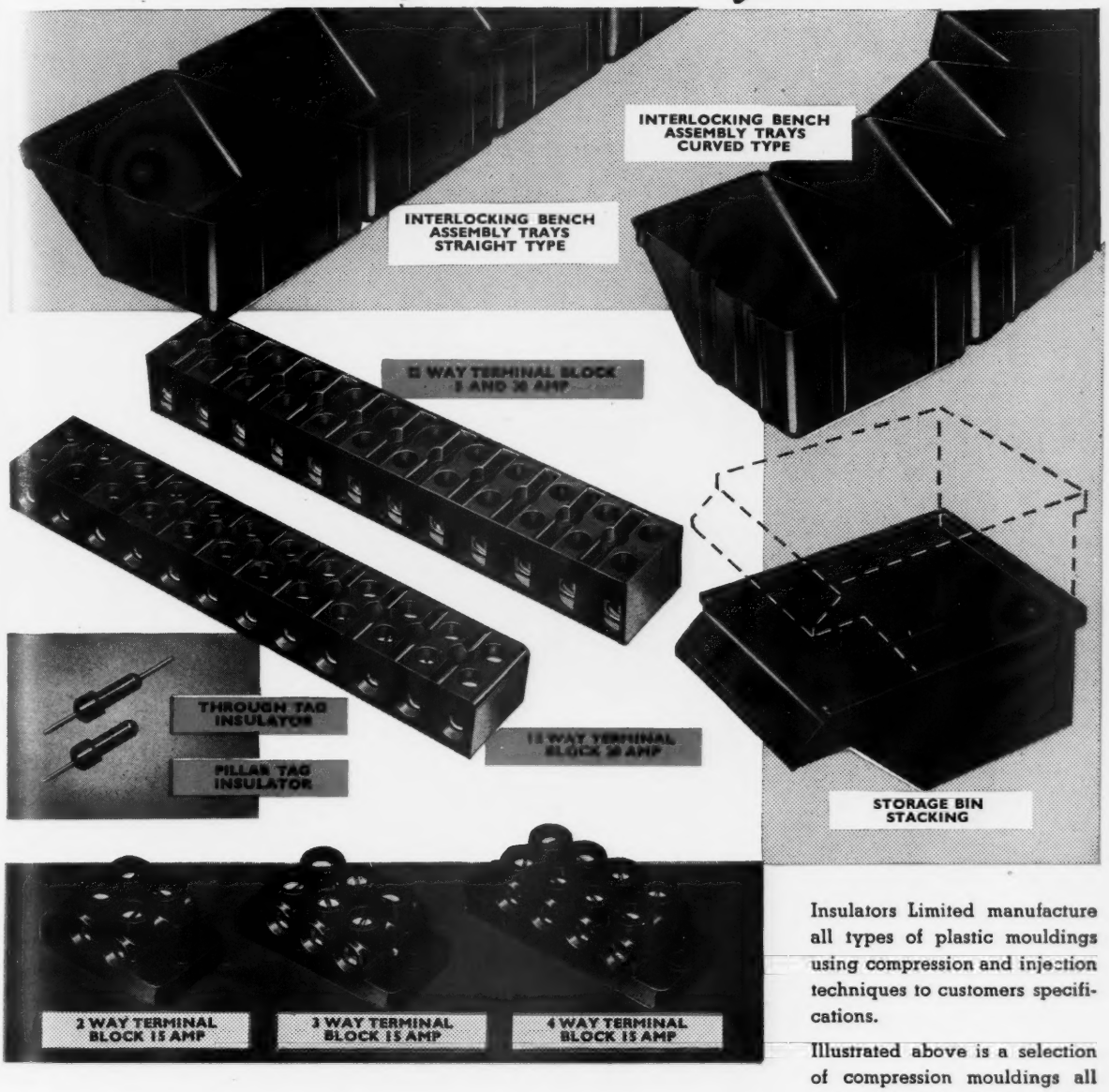
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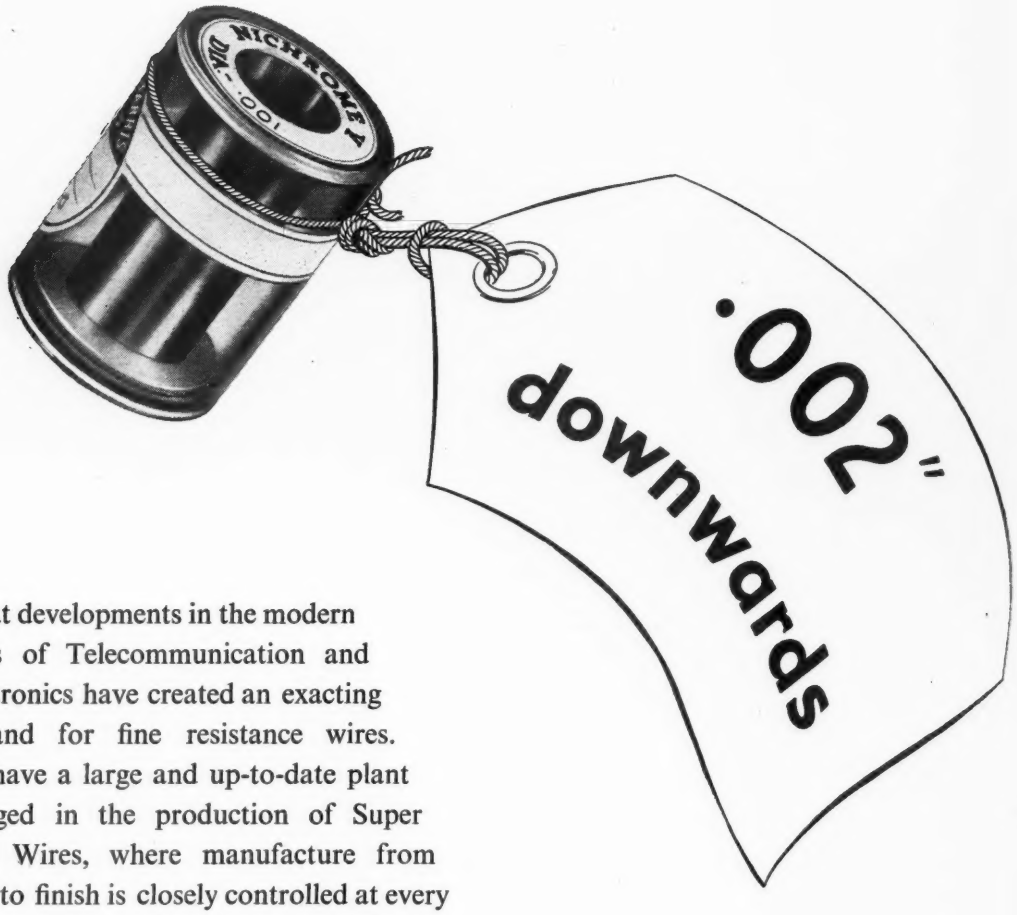

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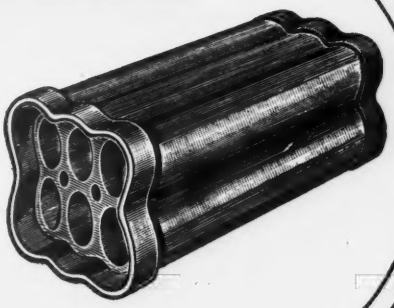

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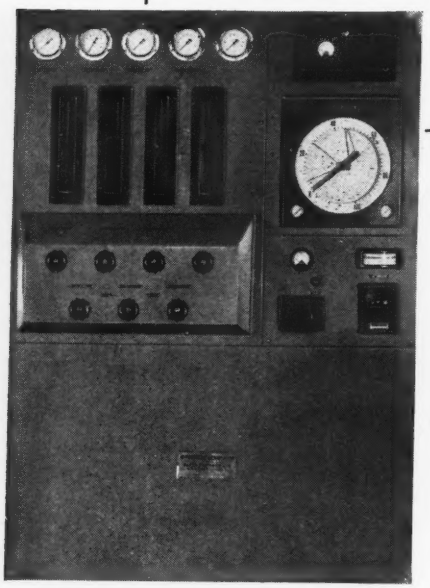

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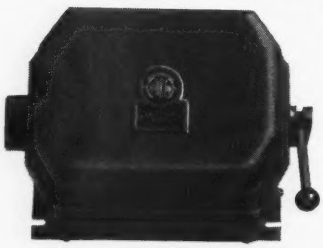

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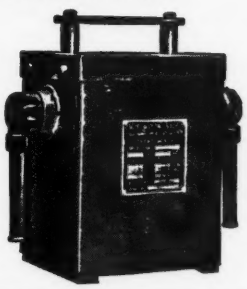

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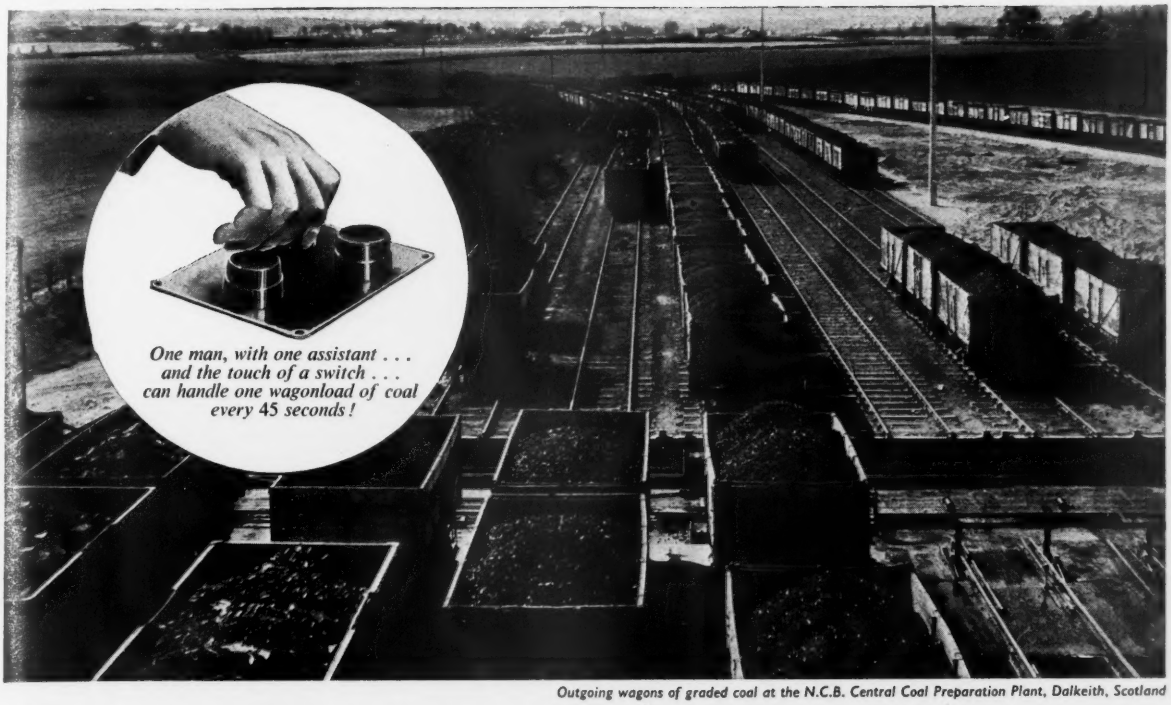


Outgoing wagons of graded coal at the N.C.B. Central Coal Preparation Plant, Dalkeith, Scotland

NEW APPROACH TO WAGON HANDLING

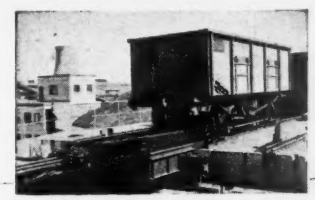
. . . Mitchell system means smaller sidings, quicker turnround, less gear, greater safety

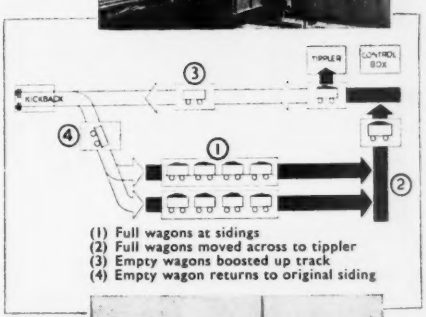
How many men work on your coal sidings? How many locomotives or capstans? What space is wasted by sprawling tracks? How much tonnage can you handle per hour?

The generally unsatisfactory answers given to such questions as these inspired the design of the Mitchell system of wagon handling—a mechanical, electrically-controlled system that offers remarkable scope for increased efficiency at power stations, collieries, coal preparation plants, steelworks, etc., and other centres of industry possessing marshalling yards.

The Mitchell system can be operated by two men. It takes wagons from the arrival sidings, loads or unloads them, weighs them and remarshals ready for departure. Wagons can be emptied and returned to the same siding they arrived at "full" so that one track is used for full and empty wagons. No internal shunting, no additional motive units, no man-handling other than initial uncoupling and final recoupling, are required. The system has no limit to size or capacity and can easily handle the 1000 tons or more of coal per hour which is now being called for. And it does it with the highest degree of safety, in all weathers, round the clock if needs be.

By demanding no more than half the space occupied by traditional balloon sidings, the Mitchell system makes possible the erection of new plant on sites hitherto unsuitable, with very large savings in initial and later costs. Its flexibility makes it adaptable to any individual handling problem. Installations are already at work for the National Coal Board and the British Electricity Authority. The thoroughgoing efficiency and economy of the Mitchell system puts it far in advance of any traditional method and establishes it as the system of the future.





(1) Full wagons at sidings
(2) Full wagons moved across to tippler
(3) Empty wagons boosted up track
(4) Empty wagon returns to original siding

An installation at the British Electricity Authority, Freemens Meadows, Leicester, handling 800 tons of coal an hour. The site is limited in area and normal methods of working with balloon sidings would be impractical. The pictures show the traverser pulling an incoming truck on to the transfer rail and an emptied wagon being returned to the siding by the 'kickback'.

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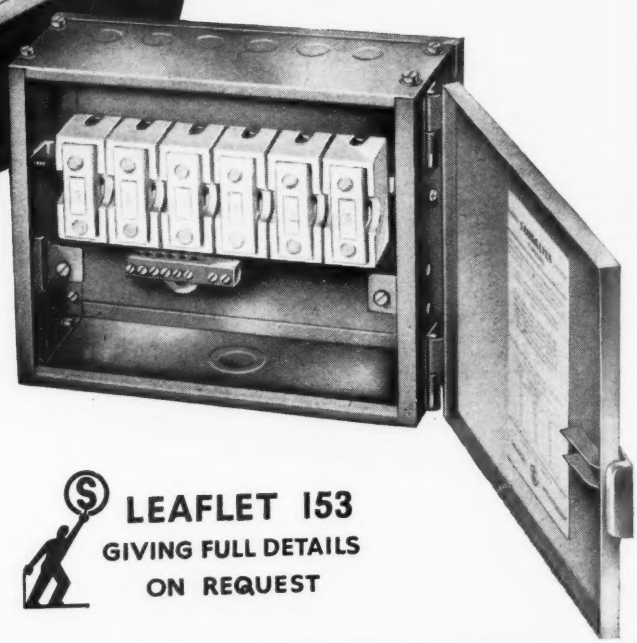

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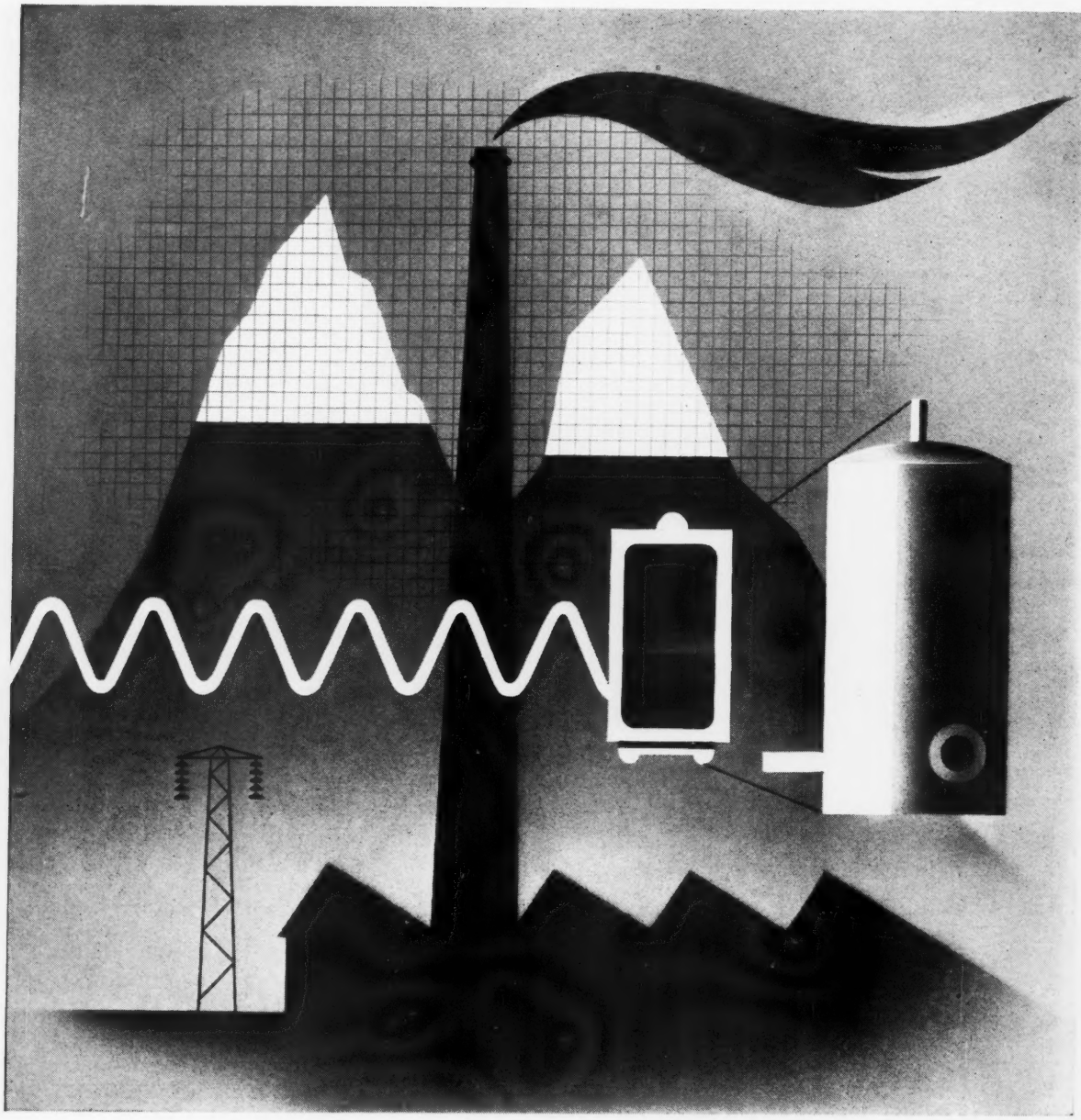

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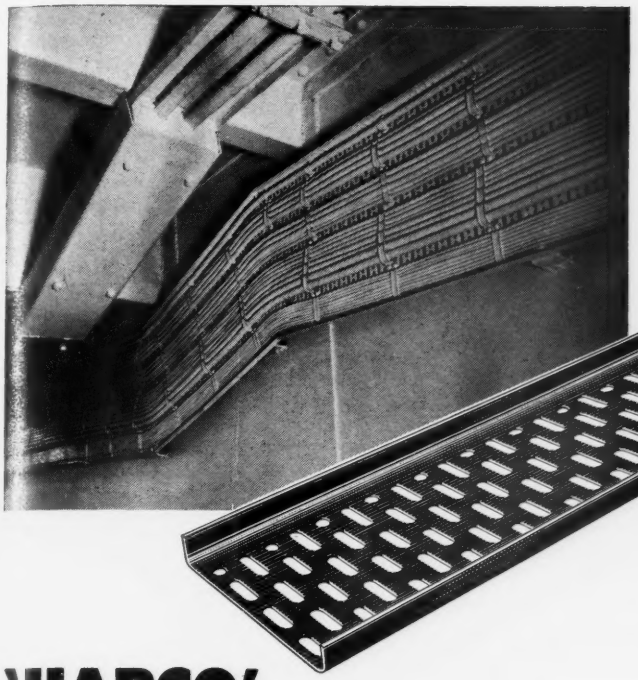

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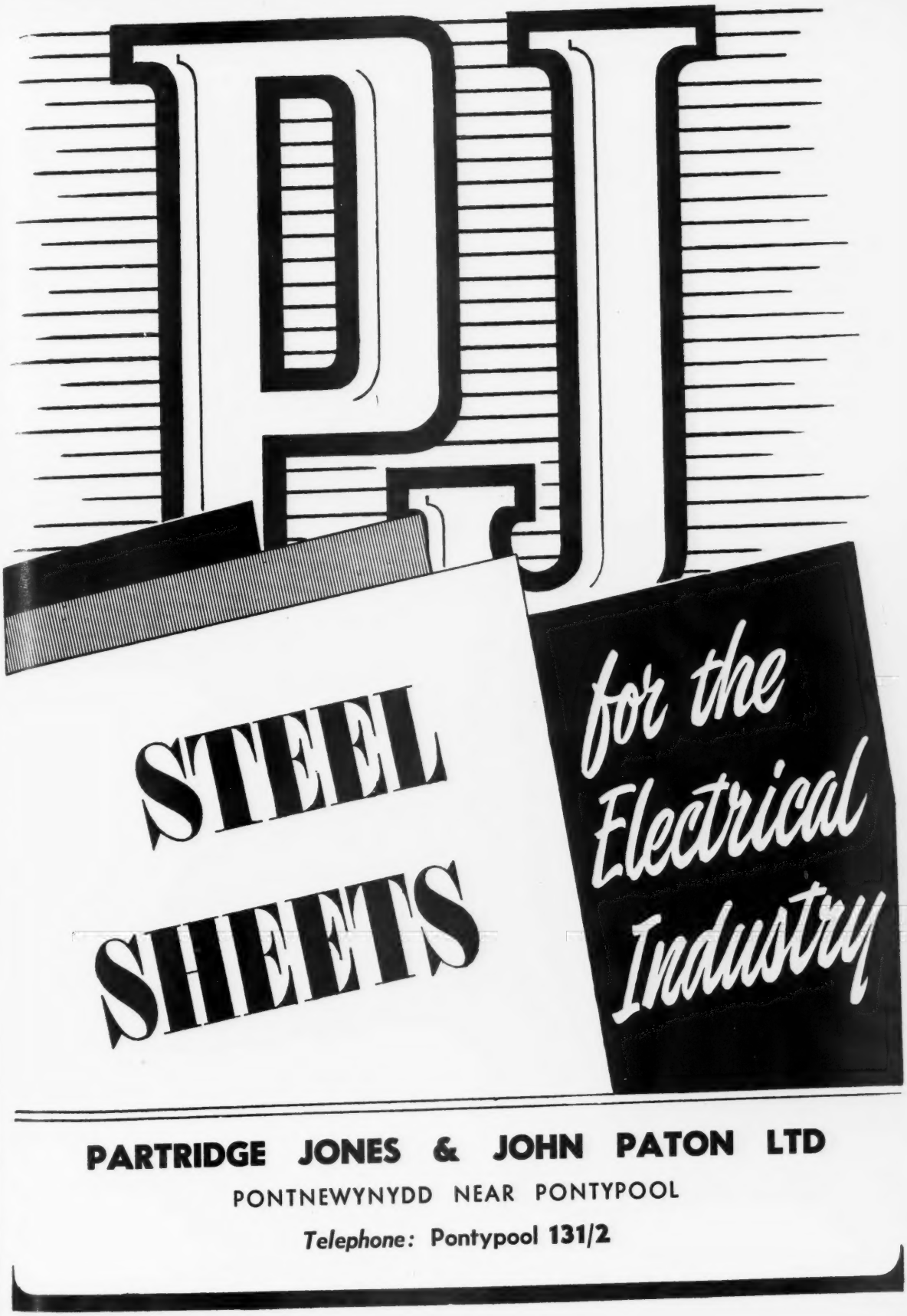

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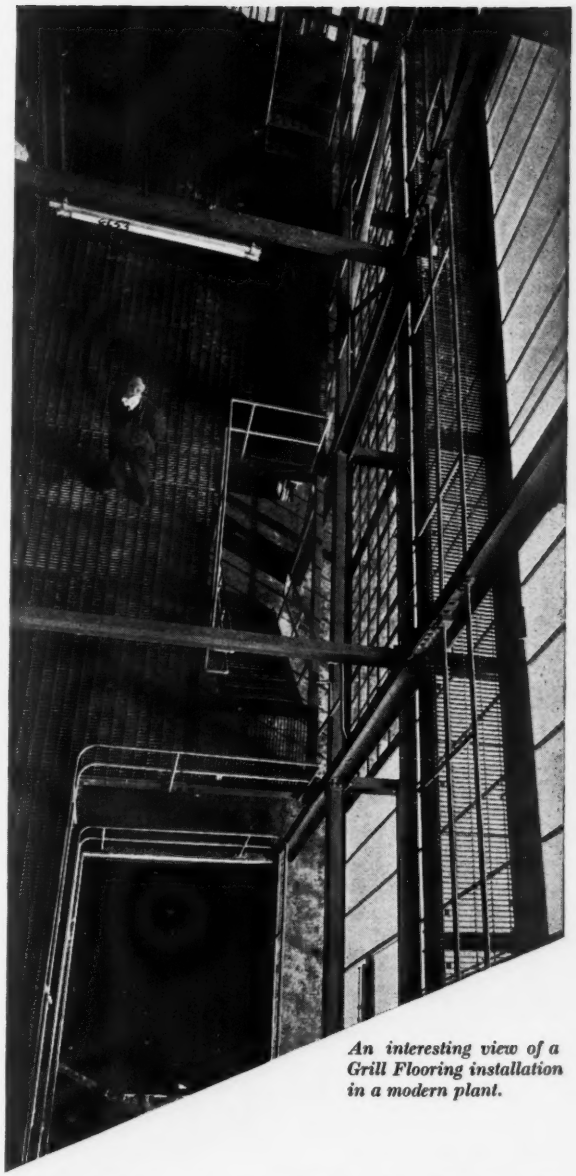

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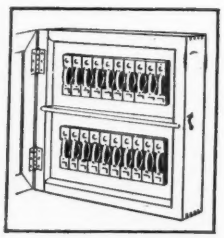

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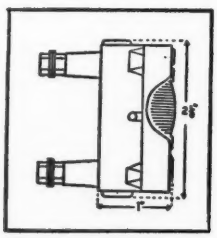

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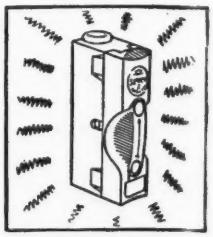

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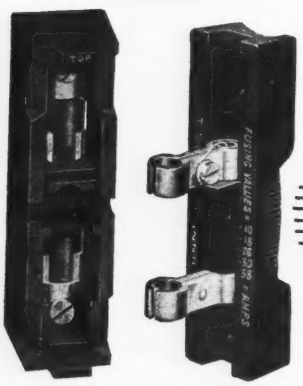

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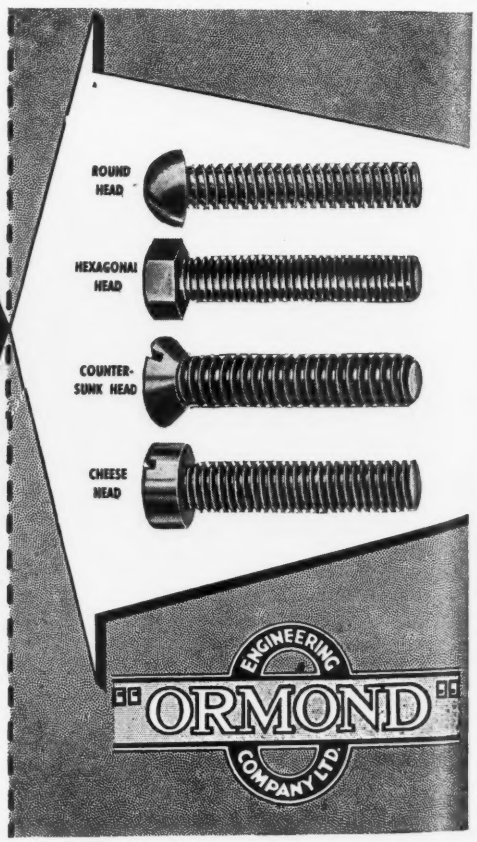

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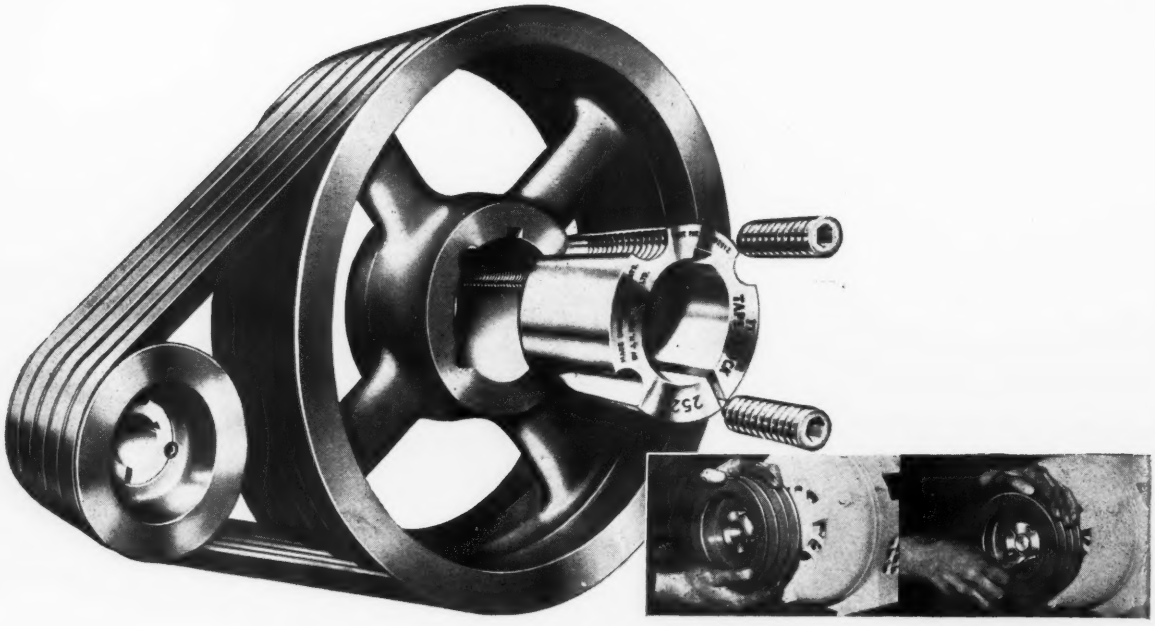

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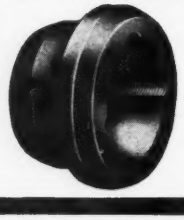

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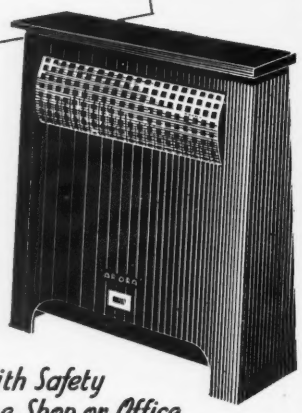

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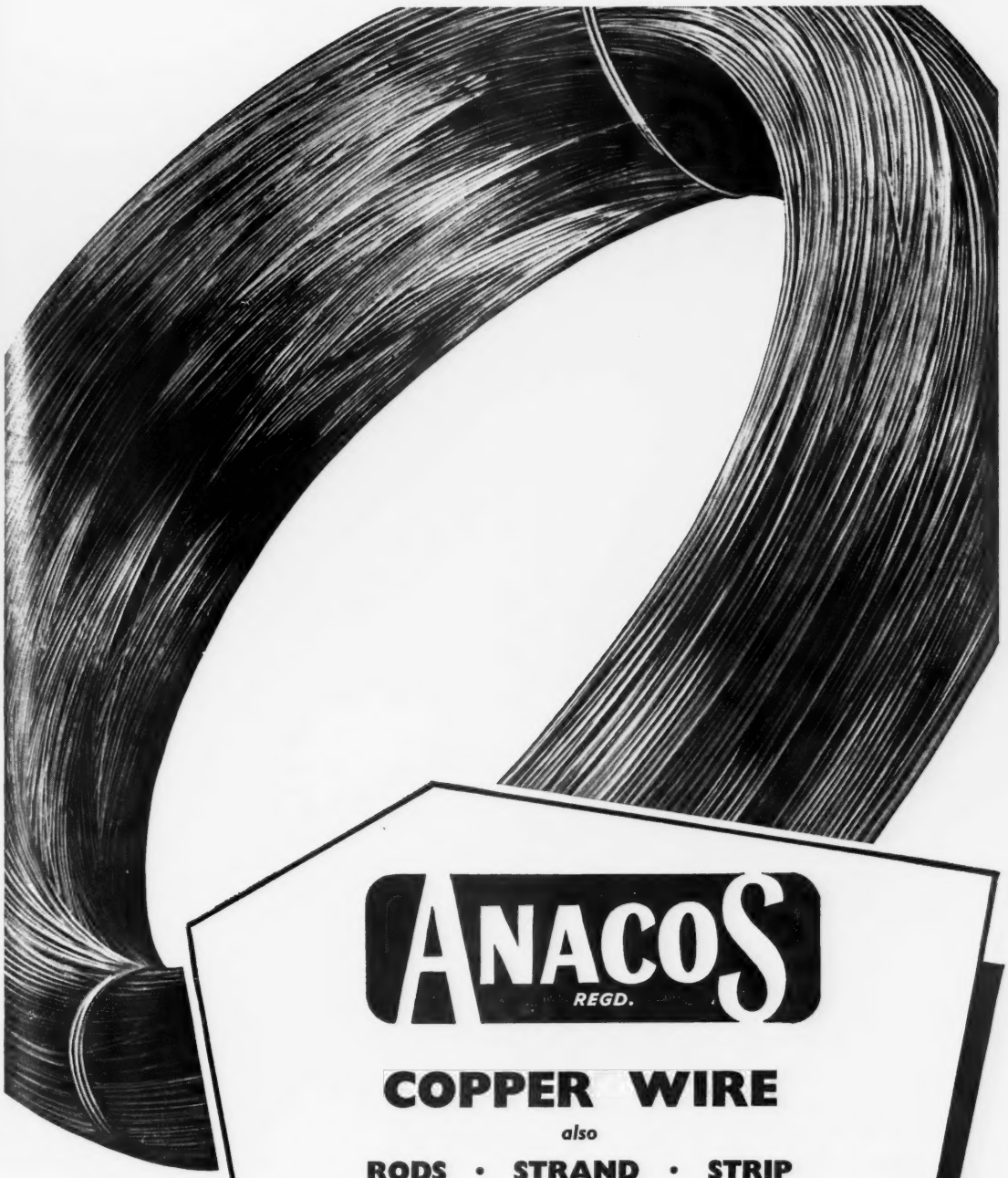

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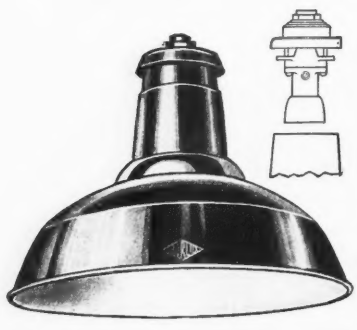

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TS 315	60 BC	12″	27/4
TS 320	100 BC	14″	32/4
TS 325	150 BC	14″	33/4
TS 330	150 ES	14″	36/-
TS 335	200 ES	16″	40/-
TS 340E	300 G	18″	65/4
TS 345	500 G	18″	65/4
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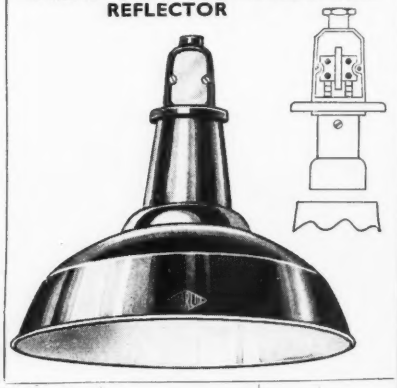

No.	Watts	Diam.	Price
TS 954	40 BC	10″	31/8
TS 955	60 BC	12″	35/4
TS 956	100 BC	14″	40/4
TS 957	150 BC	14″	41/4
TS 958	150 ES	14″	44/-
TS 959	200 ES	16″	48/-
TS 960	300 G	18″	77/4
TS 961	500 G	18″	77/4
TS 962	750/1000 G	20″	91/8
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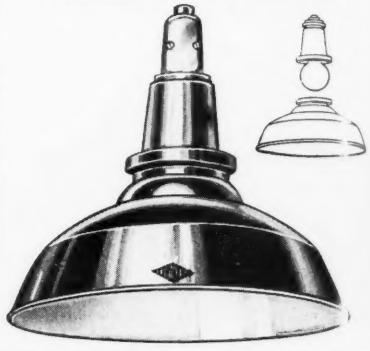
TS 964	125 3-Pin	16″	48/-

DISPERSIVE 20° CUT OFF WITH WIRING BOX, REFLECTOR DETACHABLE OVER THE LAMP

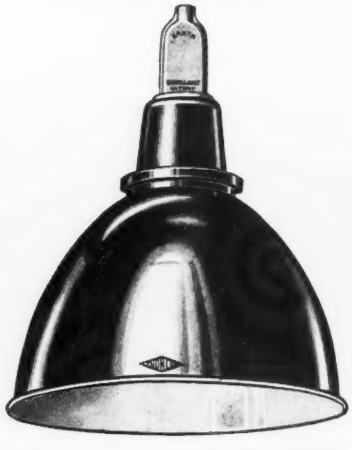


No.	Watts	Diam.	Price
TS 904	100 BC	14″	40/4
TS 906	150 BC	14″	40/4
TS 908	150 ES	14″	48/8
TS 910	200 ES	16″	52/8
TS 912	300 G	18″	81/8
TS 914	500 G	18″	81/8
TS 916	750/1000 G	20″	96/-
	DISCHARGE MV		
TS 918	80 3-Pin	14″	48/8
TS 920	125 3-Pin	16″	52/8

VENTILUX TOP. OVERLAMP. REMAINS CLEAN LONGER

No.	Watts	Diam.	Price
TG 1802	200 ES	16″	59/-
TG 1804	300 G	18″	90/-
TG 1806	500 G	18″	90/-
TG 1808	750/1000 G	20″	107/8
	DISCHARGE MV		
TG 1810	80 3-Pin	16″	59/-
TG 1812	125 3-Pin	16″	59/-
TD 1814	250	14″	88/8
TD 1822	400 MV—MVF	18″	99/-

DISPERSIVE MV FLUORESCENT TYPE WITH WIRING BOX AND DETACHABLE OVERLAMP REFLECTOR



No.	Watts	Diam.	Price
TF 300	80 3-Pin MVF	16″	53/8
TF 301	125 3-Pin MVF	16″	53/8
TF 277	250 MV	14″	79/4
TF 704	400 MVF—MV	18″	90/-

DISPERSIVE WEATHERPROOF CAST IRON TOP

No.	Watts	Diam.	Price
TD 652	250 MV	14″	128/-
TD 654	400 MV	18″	148/-

Each of the above types of reflectors are made in 45° Angle, Elliptical Angle, Distributing and Concentrating, full catalogue No. 1047 on application to:

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WELBY ROAD, HALL GREEN, BIRMINGHAM 28. *Telephone:* SPRingfield 3318-3319-3310. *Telegrams:* "Thorlux", Birmingham.

Presenting a complete range of **BELLS, BUZZERS and TRANSFORMERS for Domestic and Industrial application**

Fig. 396 "UNDERDOME" BELL
A very popular bell of unique design. Available with 3" or 4" dome.
Retail Price (3" dome) A.C./D.C. 3-4½ v. 7/4d.
Prices for other voltages on application.

GENTS' OF LEICESTER

Fig. 398 "ALL-IN-ONE" BELL
An ideal Domestic Bell. Battery under snap-on cover. Bell movement under 3" gong.
Retail Price: 11/6d. (Battery extra).

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Fig. 382 "TWO-IN-ONE" BELL
Dual purpose bell. "Ring" and "buzz" from same unit. A.C. operation through small transformer.
Retail Price: 14/8d.

Fig. 391 BAKELITE CASED BELL
Conventional Bell for battery or transformer working as ordered. Can be supplied with Dome, Church or Sheep Gong.
Retail Price (3-4½ v. D.C.) Dome Gong: 10/2d.

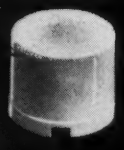

Fig. 384 MINIATURE DUO-TONE BUZZER
Very efficient buzzer for operation on D.C. for high pitch, A.C. for medium pitch, or both from two pushes.
Retail Price (3-4½v DC and 8v AC) 7/-

Fig. 1079 SURFACE DIS-CO-BELL
A 7" resonant disc gong. Gives a distinctive note. Small projection, bronze finish. Flat battery inside or transformer working.
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Fig. 1132 TRANSFORMER
Air-cooled single phase transformer. Case tapped ½" conduit entry. Fused secondary. Primary and secondary windings to suit requirements. Output up to 200 V.A. Prices on application.

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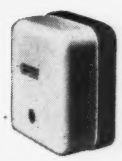

Fig. 1139 TRANSFORMER*
Suitable for Bells and Domestic "Chimes."
OUTPUT 2 AMPS.
Retail Price: 18/-

Fig. 1065 UNDERDOME BELL
8" Industrial Bell with movement under Cast steel gong. Models available for Battery, A.C. or D.C. for voltages up to 250.
Prices on application.

These products mean Business — our Domestic models are contained in attractive "fast selling" packs.

Write for our latest priced Catalogue giving full details of these and other similar products. Ask for Book 1 Section 2.

Fig. 145 METALCLAD BELL
Very popular Industrial Bell. Models for Battery, A.C. or D.C. up to 250 v. Dome, Sheep or Church gongs in Steel or Bell metal.
Prices on application.

*An entirely new transformer ideally suited for Industrial and Domestic applications. Sheet steel cover stove enamelled cream with black plastic base. Fused secondary.

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£165 A WEEK SAVING

Modernisation is in the air at Rochdale where The Standard Mill Ltd. have put a 725-kW oil-engined generating plant in one of their largest cotton mills, to take the place of the steam-driven unit. The engine is a Mirrlees K-type 8-cylinder diesel (shown below), directly coupled to a Brush alternator. Since the plant has been in service, coal consumption has been cut by one-half, showing an overall saving of £165 per week. For further information about this interesting Mirrlees installation, write for Publication No. 1483.

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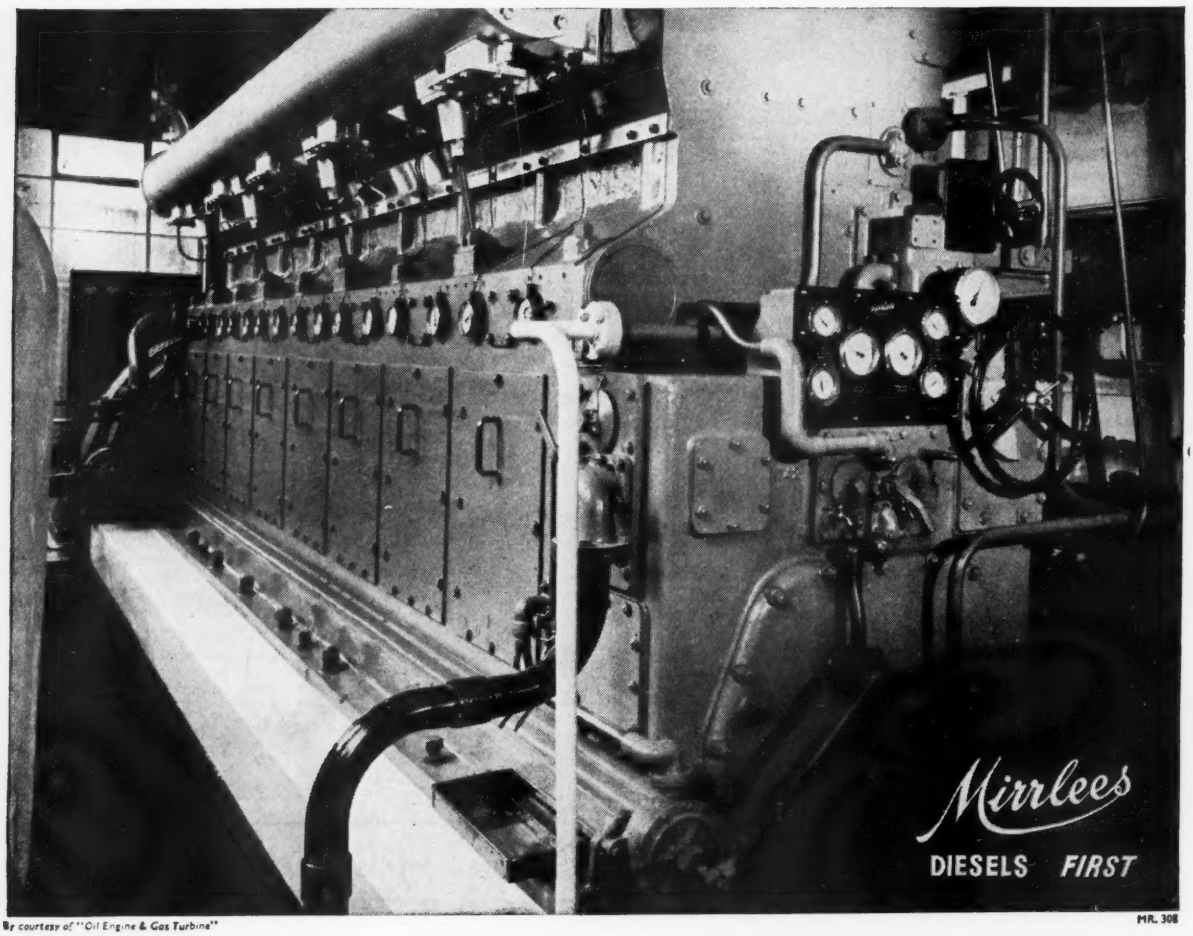

By courtesy of "Oil Engine & Gas Turbine"

MR. 308

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FREE testing sample. Write to us for a sample of this new, A.I.D. approved, activated solder wire with non-corrosive RESINACT core. It is specially designed for all electrical work and is available to any specification in sizes from 4-22 W.G. We are specialists in all forms of fusible alloys.

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3-5 kW FAN UNIT HEATER

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- Accessible for service
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3 kW Fan Unit Heater £12.12.0 lis
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Specification—

Casing : Aluminium Alloy of high tensile strength.
Elements : High-grade Nickel Chrome. Black Heat, easily replaceable.
Motor : Shaded Pole Single Phase with large bearing surface.
Voltages : 3 kW, 200/250 V, A.C.
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Finish : Polychromatic Bronze.

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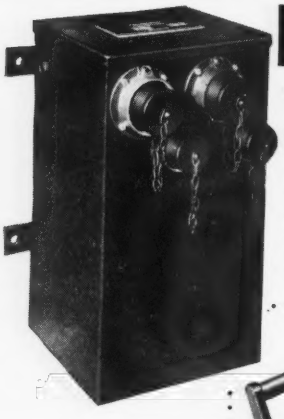

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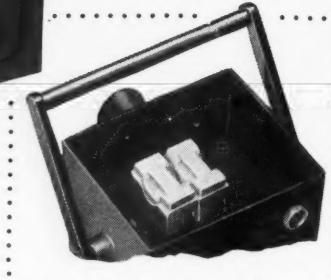
TRANSFORMER UNITS Type 2361

These units are available with back fixing straps for wall mounting, or fitted with carrying handle for use as portable units. They are generally in accordance with B.S. 794-1938



★ *Above:* Type 2361/5 (1000VA.) Two 5 amp. and two 15 amp. outlet sockets.

Right: Interior view of Portable Unit Type P2361/1 showing carrying handle and fuses.

RATINGS from 150 VA to 1000 VA

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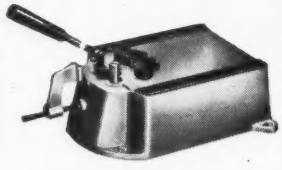
HYDE FOOT-OPERATED WIRE STRIPPER

Strips a wide range of insulated wires and small flexible cables up to ¼" outside diameter. Operating in one quick, effortless action, the stripper will not nick or damage wires.

HYDE E-Z WIRE STRIPPER

Used by hundreds of manufacturers, contractors and service agents. Precision stripping with the E-Z saves wasting wire, prevents nicking and protects the user's fingers.

Stripping without teasing



HYDE BENCH-TYPE CABLE STRIPPER

Strips insulation from cables up to ⅜" outside diameter, no splaying, no nicking; and one single movement does the whole job quickly and cleanly.

The days of clumsy stripping with knife or pliers have gone—the efficient, modern method is to use HYDE wire and cable strippers. Adjustable stops control length of strip. For greater production and perfect results, without skill or experience, HYDE strippers are essential.

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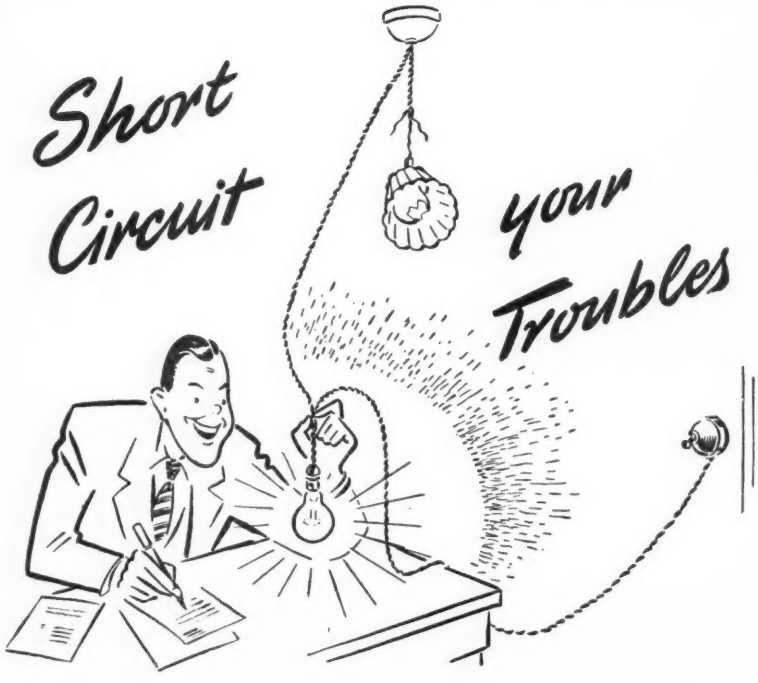

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What's new *in Radio, Television and Electronics . . ?*

Out September 27
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A review of developments and trends as seen at the Radio and Television Show

This year's Radio Show revealed many new developments in domestic radio and TV, while at the Farnborough Air Display, a great deal that was new in communication and navigation equipment was exhibited. Learn all about these highly-important developments from next Monday's . . .

Wireless World Radio Show Review

Iliffe & Sons Ltd., Dorset House, Stamford St., London, S.E.1

We're settling your differences

In common with the other leading British electrical manufacturers, Crompton Parkinson are now standardising motor dimensions in order to put a stop to those dimensional differences that have proved troublesome in the past. The first motors to conform with the agreed standards—the "KLOSD" squirrel cage type—are now available up to 25 h.p. and conform to B.S. 168 for electrical performance and B.S.2083 for dimensions.

With Crompton Parkinson you still have certain differences of a welcome nature—the differences that arise from an organisation that insists upon materials, brains and workmanship of the highest degree obtainable. Users of "KLOSD" motors will find these qualities exemplified in continuous and long-lived efficiency.

When it comes to A.C. MOTORS . . .

you've got to hand it to Crompton Parkinson LIMITED

ELECTRICAL EQUIPMENT

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HILMOR
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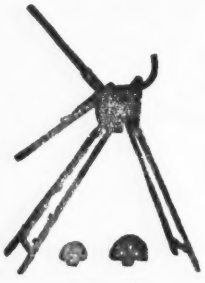

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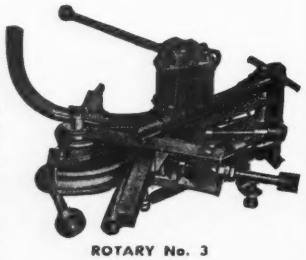
SERIES "EL"

Lightweight completely Portable Outfits to bend up to 1¼" heavy and light gauge conduit and fitted with pipe vice for cutting and screwing purposes.

TYPE "ROTARY HYDRAULIC" No. 3

The latest portable machine to bend up to 2" light and heavy gauge conduit. Produces sets, double sets, simple and compound bends, etc., all to exact measurements and requires minimum of manual effort to operate.



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HILMOR LTD. (Sales & Service)
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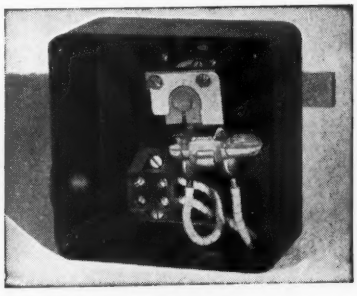

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MERCURY SWITCH UNITS

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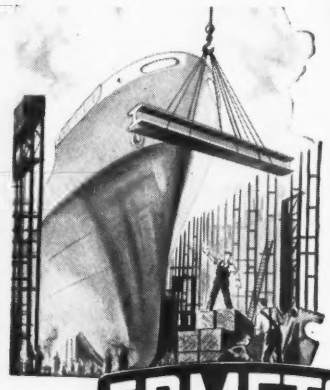
Upholding Britain's Name in Engineering!



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Ermeto joints have no equal

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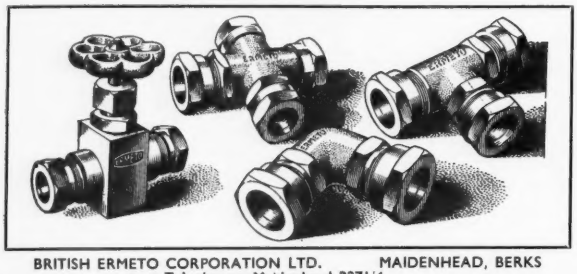

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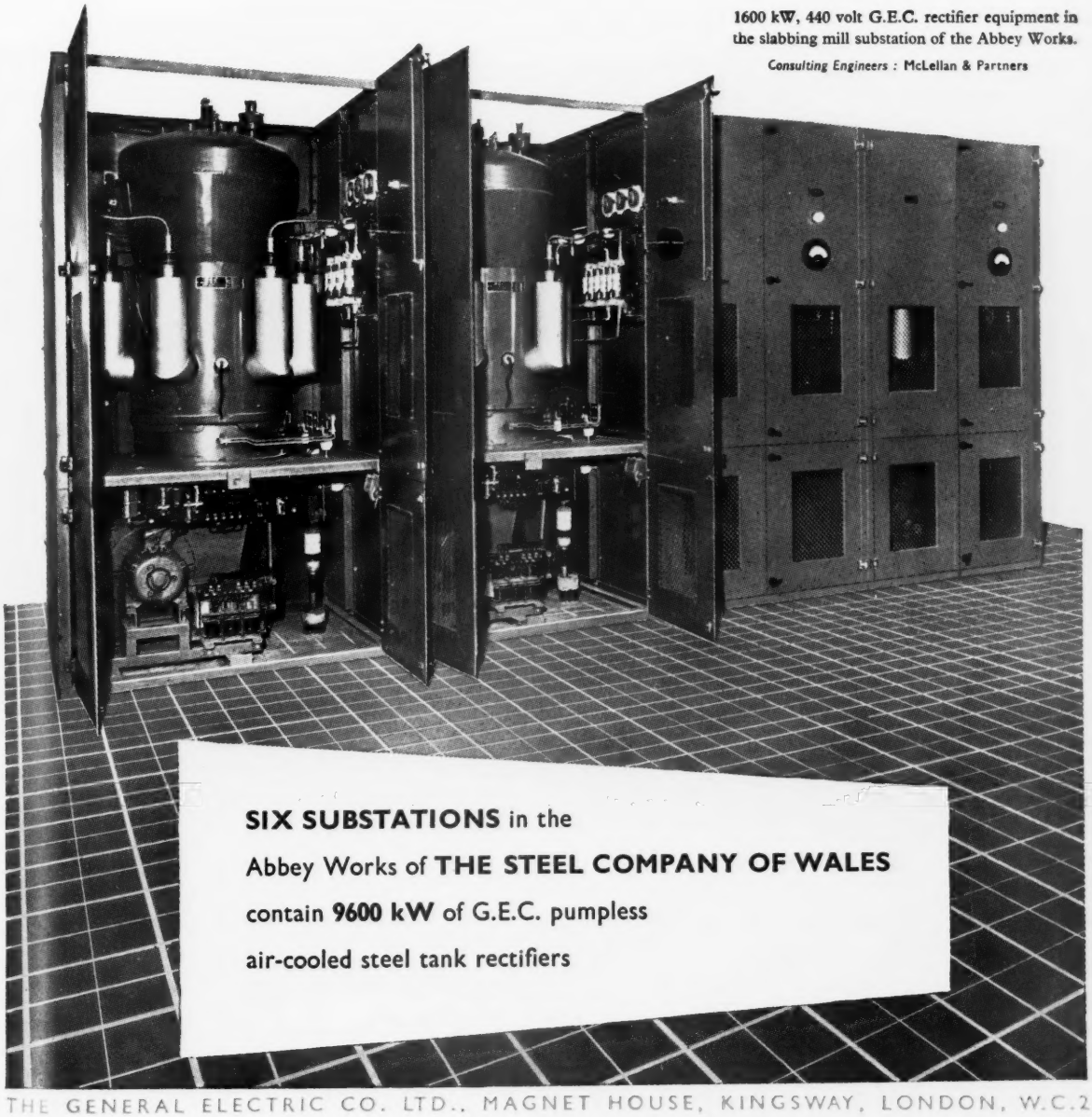
G.E.C.

Steel Tank Rectifiers

FOR STEELWORKS



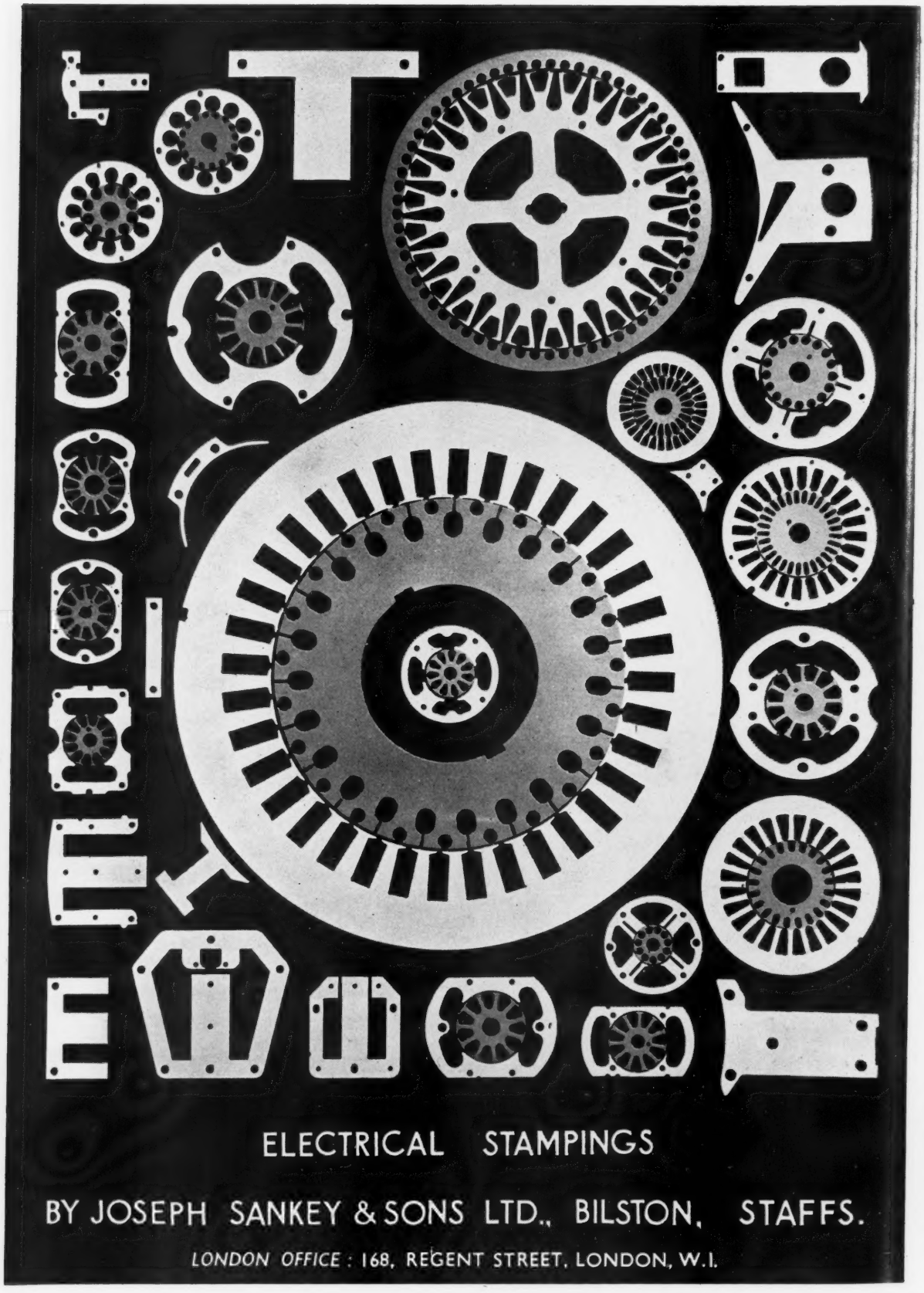
1600 kW, 440 volt G.E.C. rectifier equipment in the slabbing mill substation of the Abbey Works.

Consulting Engineers : McLellan & Partners

SIX SUBSTATIONS in the
Abbey Works of **THE STEEL COMPANY OF WALES**
contain **9600 kW** of G.E.C. pumpless
air-cooled steel tank rectifiers

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

EB5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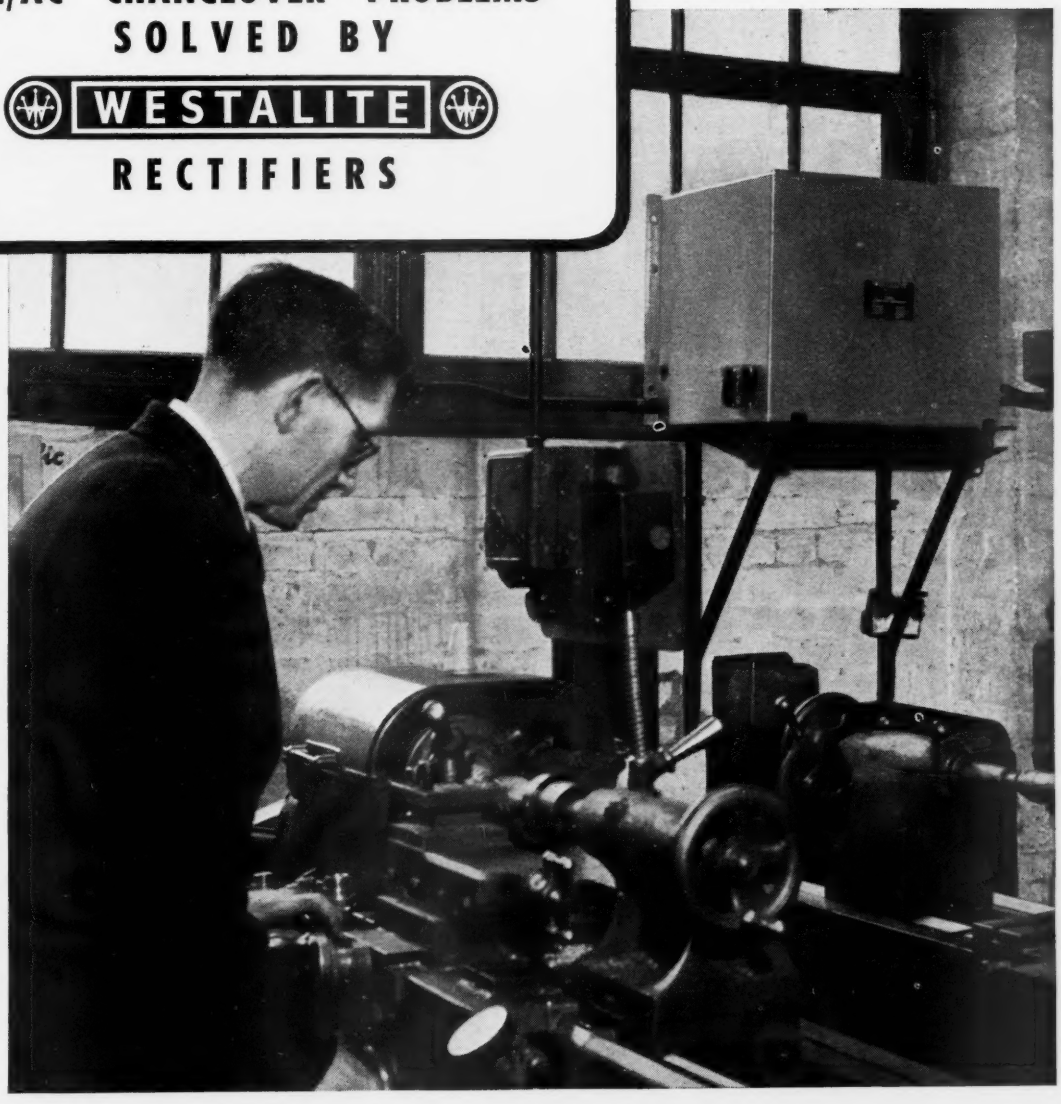
BY JOSEPH SANKEY & SONS LTD., BILSTON, STAFFS.
LONDON OFFICE : 168, REGENT STREET, LONDON, W.I.

DC/AC CHANGEOVER PROBLEMS SOLVED BY WESTALITE RECTIFIERS



The illustration (by courtesy of Messrs. Self Engineering Co. Ltd.) shows a lathe powered by a DC motor operating from a "Westalite" rectifier, and is one of the many installations carried out by the London Electricity Board in the DC/AC changeover in the South-East area of London.

By connecting a "Westalite" rectifier of the required output between the AC supply and the existing DC equipment, operations carry on as normal. It is as simple as that. Extensive ranges of single- or three-phase "Westalite" rectifiers for all industrial applications are available and are listed in Data Sheet No. 802. Write for a copy to the address below:

WESTINGHOUSE BRAKE & SIGNAL CO. LTD.

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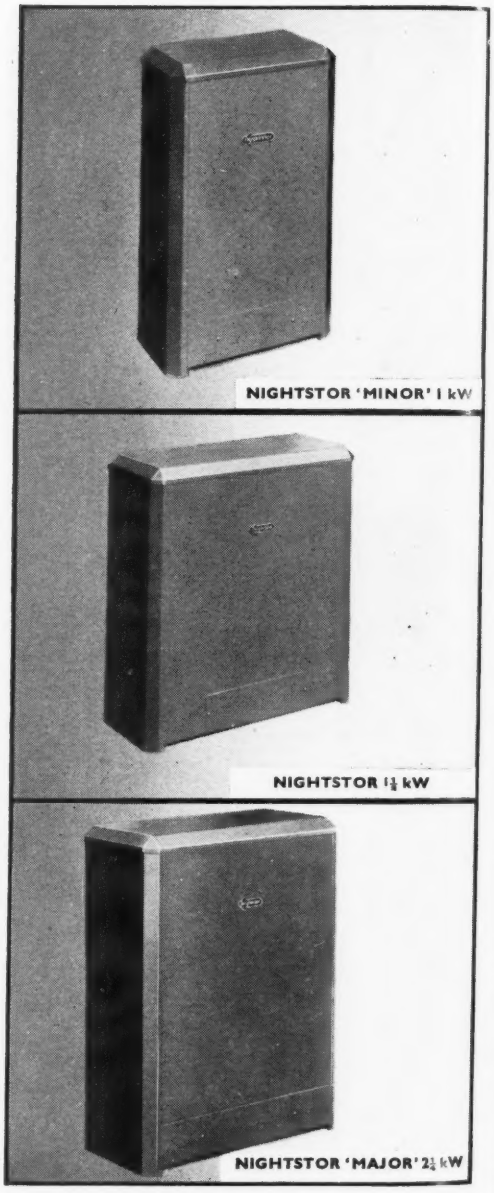
Nightstor heater

a G.E.C. product

—now available in three sizes for a wider application of heating installations

The Nightstor Heater is a most economical way of heating offices, schools, workrooms etc. It stores heat at night, when electricity rates are often reduced, switches off automatically in the morning and then gives out an even flow of warmth throughout the day.

Now is the time when wise people plan their winter heating. Send today for full-descriptive leaflet HO2482.



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- ★ Clean to run. No fumes, no smoke, no stoking.
- ★ Offices or workshops are warm when staff arrive.
- ★ Inexpensive to buy, simple to install.
- ★ Low running costs.

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ADVERTISEMENTS are accepted up to **First Post on Monday** of the week of issue, and should be addressed to Classified Advertisement Department, Dorset House, Stamford Street, London, S.E.1.

CLASSIFIED advertisements are PREPAID at 3/- per line (approx. 6 words) per insertion. Where an advertisement includes a Box Number this counts as two words and carries an additional charge of 1/-.

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SITUATIONS WANTED:—Three insertions under this heading can be obtained for the price of two if ordered and prepaid with the first insertion.

REPLIES to Box Numbers should be addressed to the Box Number in the advertisement, c/o ELECTRICAL REVIEW, Dorset House, Stamford Street, London, S.E.1, but if not to be delivered to any particular firm or individual they should be accompanied by instructions to this effect, addressed to the Manager of the ELECTRICAL REVIEW. Replies in such cases cannot be returned. The name of an advertiser using a Box Number will not be disclosed.

Original testimonials should not be sent with applications for employment

OFFICIAL NOTICES, TENDERS, ETC.

DISPOSAL OF PLANT

THE BRITISH ELECTRICITY AUTHORITY invites tenders for the demolition, disposal and sale of redundant plant at Nottingham Power Station. The plant includes two rail wagon tipplers for handling 10-12-ton wagons of small coal; coal belts, bucket elevators, lead/acid battery, evaporators, sundry structural steelwork and other items.

The specification of plant and conditions of sale, No. 6/Nottingham/56/M25A, may be obtained from the Divisional Controller, British Electricity Authority, East Midlands Division, Barker Gate, Nottingham, quoting reference C.C/185/43/M25A.

Applications in writing should be accompanied with a deposit of £2, which will be returned on receipt of a bona fide tender. The specification is not transferable.

Tenders are to be delivered to the Divisional Controller not later than 12 noon on Monday, 4th October, 1954. 5209

BOROUGH OF GRANTHAM

Electric Street Lighting

TENDERS are invited for the supply and erection of 668 Concrete Lighting Columns and Wall Brackets, together with lanterns and control gear.

Specification and bills of quantities may be obtained from the Borough Engineer and Surveyor, Guildhall, Grantham, on payment of a deposit of £2 2s., which will be returned on receipt of a bona fide tender.

Tenders in plain sealed envelopes endorsed "Tender for Street Lighting" should reach the undersigned not later than 10 a.m. on Tuesday, 12th October, 1954.

JOHN F. GUILE,
Town Clerk.

Guildhall, Grantham.
September, 1954. 5079

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through the Local office of the Ministry of Labour and National Service, etc., if the applicant is a man aged 18-64 or a woman aged 18-59 inclusive, unless he or she or the employer is excepted from the provisions of The Notification of Vacancies Order, 1952.

MIDLANDS ELECTRICITY BOARD

Wolverhampton and District Sub-Area

Sub-Area Engineer

APPLICATIONS are invited for appointment to the above post as from 1st January, 1955.

Applicants, who should have extensive experience in the design, construction, operation and maintenance of large distribution systems, will be responsible to the Sub-Area Manager for all engineering matters in the Sub-Area.

Applicants should have received a thorough technical training and have good executive experience in a responsible post. Preference will be given to those holding appropriate qualifications, including Corporate Membership of the Institution of Electrical Engineers.

The commencing salary will be £1,600 per annum (N.J.M. Scale 4, £1,600/£1,750 per annum). Superannuable.

Applications, stating age, experience, qualifications and present salary, should be forwarded within 7 days to Mr. F. J. Elliott, Manager, Wolverhampton & District Sub-Area, Midlands Electricity Board, 83, Darlington St., Wolverhampton.

A. STEPHENS,
Secretary. 5224

YORKSHIRE ELECTRICITY BOARD

No. 3 (Sheffield) Sub-Area

SENIOR ASSISTANT (Billing and Rentals). Applicants should have had a sound education and training in accountancy and possession of a recognised accountancy qualification will be an advantage.

Applicants should be capable of organising and controlling efficiently a large staff responsible for the billing of electricity accounts together with the maintenance of debtors control accounts and the production of statistical information relating to the sales of electricity, etc. Some knowledge of mechanised accounting systems is also required.

Salary N.J.C. Grade 6, £730/£25/£805 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 3 (Sheffield) Sub-Area, Yorkshire Electricity Board, Commercial Street, Sheffield, not later than Thursday, 7th October, 1954.

No. 6 (Hull) Sub-Area
BRIDLINGTON DISTRICT

THIRD ASSISTANT DISTRICT ENGINEER (Commercial). Applicants should have had a sound practical training in electrical installation work, and have an up-to-date knowledge of the utilisation of electrical appliances on farms. The successful applicant will be required to negotiate with consumers requiring electricity supplies, particularly in rural areas, and deal with estimates for installations, tariffs and sales development generally.

Candidates should be in possession of the Higher National Certificate in Electrical Engineering, or similar qualification.

The successful applicant will be required to reside in the district.

Salary N.J.B. Class D, Grade 9, £561/£578 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 6 (Hull) Sub-Area, Yorkshire Electricity Board, Ferensway, Hull, not later than Thursday, 7th October, 1954.

No. 2 (Huddersfield) Sub-Area
HALIFAX DISTRICT

DEMONSTRATOR. Applicants must have had 2 years' training in Domestic Science at a recognised college and have obtained the E.A.W. Certificate. Previous extensive experience of demonstrating is essential.

Salary N.J.C. Grade 1, £400/£490 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 2 (Huddersfield) Sub-Area, Yorkshire Electricity Board, Market Street, Huddersfield, not later than Thursday, 7th October, 1954.

No. 3 (Sheffield) Sub-Area

CHARGEHAND ELECTRICIAN (Telephone). Applicants should have a knowledge of the workings of automatic and manual telephone exchanges and should have had practical experience in the maintenance of such systems. Experience in the installation of telephones, running of cables, testing, fault location and ability to drive is essential. A knowledge and experience of V.H.F. radio communication equipment will be an advantage.

The conditions of service are in accordance with the N.J.I.C. Agreement.

Rate of pay 3s. 11d. per hour.

Applications, giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 3 (Sheffield) Sub-Area, Yorkshire Electricity Board, Commercial Street, Sheffield, not later than Thursday, 7th October, 1954. 5218

THE ELECTRICITY CORPORATION OF NIGERIA

has the following vacancies on its staff for service in Nigeria.

1. POWER STATION METER AND INSTRUMENT MAINTENANCE ENGINEER. Candidates, preferably holding the H.N.C., should not be more than 45 years of age and have had several years' experience in the care, maintenance, overhaul and calibration of power station meters and instruments such as pressure gauges, steam and water flow meters and CO_2 recorders, etc., and should be capable of taking complete responsibility for the efficient performance of such instruments in 14 power stations throughout Nigeria. Salary in the range £830-£950 per annum.

2. SWITCHGEAR ERECTORS. Candidates should be not more than 45 years of age and have had several years' experience in the erection of H.T. metalclad switchgear up to 11 kV. Drawing office experience and a knowledge of secondary wiring would be an advantage. They should be capable of working on their own initiative and of taking charge of African fitters and labourers. Salary in the range £830-£950 per annum.

3. INSPECTOR OF WORKS (Building and Civil Engineering). Candidates should be capable of estimating and supervising work of both contract and direct labour. They should have a general all-round practical experience in building work and reinforced concrete and must be able to organise and control jobs under contract or direct labour and with a minimum of headquarters direction. Salary in the range £830-£950 per annum. Age not more than 45.

4. ASSISTANT TO COMMERCIAL MANAGER. Candidates should have had good experience in the commercial branch of an electricity supply undertaking, including a knowledge of tariffs and the formulation of hire, hire-purchase and other sales or development schemes. A knowledge of purchasing procedure is essential and the possession of a recognised electrical engineering qualification or a Diploma of the Electrical Development Association is desirable. Preferably between 25 and 35 years of age. Commencing salary in the scale of £800-£1,000 per annum.

5. ASSISTANT SURVEYOR. Candidates should have good practical survey experience in the field and a sound knowledge of tacheometry, precise levelling, theodolite and chain surveying, adjustments to instruments and plotting and reporting. This post is for one tour of 18/24 months and candidates should preferably be between the ages of 25 and 35. Salary in the range of £760 to £800.

All salaries carry a generous expatriation allowance. Vacancies 1 and 4 are on a permanent and pensionable basis or on contract terms if preferred. Vacancies 2, 3 and 5 are on contract terms for one or two tours. They carry an increase in basic salary of 10%, and a gratuity of £37 10s. for every 3 months' service is payable on the conclusion of the contract. Free passages are provided for man and wife, with assisted passages or U.K. maintenance allowance for 2 children up to 18 years of age. Free furnished quarters, low income tax, home leave on full pay.

Forms of application can be obtained from the Liaison Officer, 11, Manchester Square, London, W.1. 5217

A. H. HUNT (CAPACITORS) LTD.

require the following technical staff:—

SENIOR ASSISTANTS, with qualifications in Chemistry or Physics; also

JUNIOR LABORATORY ASSISTANTS for development and process control work on paper, ceramic and electrolytic capacitors.

Apply in writing to the Personnel Manager, A. H. Hunt (Capacitors) Ltd., Bendon Valley, Garratt Lane, London, S.W.18. 5158

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited for the following positions within the Division:—

SHIFT CONTROL ENGINEER, AVON POWER STATION, WARWICK (Vacancy No. 144/54/ER). Applicants should have had some experience in power station control and have O.N.C. in electricity.

Salary will be in accordance with Class E, Grade 10 (£555-£569 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 5th October, 1954.

SENIOR DRAUGHTSMAN (CIVIL), CONSTRUCTION DEPARTMENT (Vacancy No. 112/54/ER). Candidates should have experience in the preparation of detail drawings and in the design of one or more of the following subjects:—

Reinforced concrete structures.
Piled and slab foundations for heavy components.
Cable subways, bridges and culverts.

The salary will be in accordance with Grade 4 (£671-£780 per annum) or Grade 5 (£567-£671 per annum) of Schedule D of the National Joint Board Agreement.

Closing date for receipt of applications, 5th October, 1954.

ASSISTANT SHIFT CHARGE ENGINEER, FREEMEN'S MEADOW POWER STATION, LEICESTER (Vacancy No. 143/54/ER). Applicants should have experience in the operation of a large pulverised fuel-fired station. The principal duties will be in the boiler house. Technical qualifications up to H.N.C. are desirable.

The salary will be in accordance with Class H, Grade 9 (£680-£706 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 5th October, 1954.

SHIFT CHARGE ENGINEER, AVON POWER STATION, WARWICK (Vacancy No. 148/54/ER). Applications are invited from qualified engineers for the position of Shift Charge Engineer at Warwick Power Station. Applicants should have had experience in the operation of steam turbines and boiler plants.

Salary in accordance with Class E, Grade 7 (£649-£681 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 11th October, 1954.

These appointments will be pensionable within the terms and provisions of the British Electricity Authority and Area Boards Superannuation Scheme.

Applications should be submitted on the official form A.E.6/ACT which may be obtained from the Divisional Establishments Officer, British Electricity Authority, P.O. Box 25, Barker Gate, Nottingham, and should be returned to the undersigned by the date stated. Please quote vacancy number.

L. F. JEFFREY,
Divisional Controller. 5210

DRAUGHTSMEN

DRAUGHTSMEN required by Ministry of Supply at various locations, with experience in any of the following classes of work: Chemical plant, light or heavy mechanical, automobile, precision instrumentation, radio, radar, electrical, electronics, structural, building, jig and tool. At least 3 years' workshop training and O.N.C. or equivalent.

Starting pay (Provincial) £380 (age 20) to £550 (age 28), rising to £640. London rates higher. Paid sick leave; 20 days' annual holiday plus public holidays; 44-hour week (generally 5-day), including meal breaks. Payment for overtime.

Appointments unestablished but opportunities to compete for pensionable posts. Prospects of promotion to Leading Draughtsman, £635-£742 (Prov.), thence to Senior Draughtsman, £742-£910 (Prov.), and Chief Draughtsman, £960-£1,120 (Prov.).

Write, stating age, training, qualifications and experience, to Ministry of Supply, Est. 3(c)1, Room 519, Carlton Hotel, Haymarket, London, S.W.1. 4553

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following superannuable posts. Conditions of service in accordance with N.J.B. Agreement, Schedule A or C. Salary includes London allowance. Qualifications entitling to Graduate Membership of the I.E.E. or I.Mech.E. for post (a) and Corporate Membership for posts (b) an advantage.

(b) OPERATION AND EFFICIENCY ENGINEER, BANKSIDE GENERATING STATION (Vacancy No. 54/800). Sound technical and practical training necessary with considerable experience in operation of large H.P. turbine and boiler plant. Will be responsible for the efficiency of plant and the control of personnel. Salary Class H, Grade 5 = £929 5s. p.a.

(b) SHIFT CHARGE ENGINEER, BATTERSEA GENERATING STATION (Vacancy No. 54/801). Sound engineering training necessary followed by considerable experience in operation and maintenance of modern high-pressure, high-temperature power station plant. Salary Class M, Grade 7 = £1,035 6s. p.a.

(b) SECOND ASSISTANT ENGINEER, GROUP IV HEADQUARTERS (Vacancy No. 54/802). Applicants should be familiar with operational requirements of modern generating stations. Knowledge of salary and wage agreements for electricity industry an additional qualification. Appointment offers opportunity for experience in executive and administrative functions, and duties will include analysis of returns and programmes, and investigation of engineering problems. Successful candidate will be required to assist the Group Generation Engineer (O) in matters relating to control of a large group of stations. Applicants for the previous advertisement (Vacancy No. 54/647) will be considered and need not re-apply. Salary Class AX/EX, Grade 2, £875 14s. to £1,018 10s. rising ultimately to £1,133 p.a.

(a) GENERAL ASSISTANT ENGINEERS (EFFICIENCY & TESTING), DIVISIONAL & GROUP I HEADQUARTERS (Vacancy No. 54/803). Good technical education necessary with experience of the testing and/or operation of the mechanical plant in power stations. Salary Class AX/EX, Grade 8 = £526 1s. to £749 14s. per annum.

Applications, quoting vacancy number, may be made on forms obtainable from Divisional Secretary, British Electricity Authority, London Division, P.O. Box No. 136, Generation House, Great Portland Street, London, W.1, and be received within 14 days of this advertisement. 5203

BRITISH ELECTRICITY AUTHORITY

Midlands Division

A GENERAL ASSISTANT ENGINEER is required in the Telecommunications Section of the Technical Department. N.J.B. service conditions, superannuable appointment, salary within Schedule C, Grade 8, commencing in range £501 to £639, ultimately rising to £694 per annum.

The minimum technical qualification required is the Higher National Certificate in Electrical Engineering, or equivalent. Preference will be given to candidates who have had experience with telecommunication equipment.

Apply, quoting Vacancy No. 771MD, on Form AE6, available from the Establishments Officer, 53, Wake Green Road, Moseley, Birmingham, 13 by 9th October, 1954. 5215

MIDLANDS ELECTRICITY BOARD

JUNIOR ENGINEER required in the Sub-Area Meter Department of the Central Gloucestershire Sub-Area, located at Cheltenham. Duties will include laboratory work, substandard instrument calibration, the testing of polyphase metering equipment, both in the test room and on consumers' premises, and the carrying out of special tests on other apparatus, including switchgear and relays. Technical qualifications desirable. Salary £424 per annum (N.J.B. Grade H.16).

Apply in writing to Mr. D. Holt, Manager, Central Gloucestershire Sub-Area, Midlands Electricity Board, 126, London Rd., Gloucester.

A. STEPHENS,
Secretary. 5223

SOUTH EASTERN ELECTRICITY BOARD

ASSISTANT DISTRICT ENGINEER, Medway District. Salary £577 p.a. under N.J.B. Schedule, Class F, Grade 10. Superannuable.

Applicants should have had experience in the construction, operation and maintenance of three-phase and single-phase E.H.T. and L.T. overhead and underground systems, together with indoor and outdoor type substations, and should hold the Higher National Certificate or its equivalent in electrical engineering. The position will entail standby duty.

Applications, naming 2 referees, to Ramsden Mellor, M.I.E.E., A.I.Mech.E., Medway Manager, SEEBoard, Gardiner Street, Gillingham, Kent, by 6th October, 1954.

A. L. BURNELL,
Secretary. 5221

THE ENGLISH ELECTRIC CO. LTD.

invite applications for the following positions in their MECHANICAL & PRODUCTION ENGINEERING DEPARTMENTS at LUTON and STEVENAGE.

(1) SENIOR ELECTRICAL DESIGN ENGINEERS with H.N.C. or equivalent experience on machine tools, fighting vehicle or aircraft installations are required to lead small sections on complete design installations, including the preparation of all information required for works production.

(2) SENIOR ELECTRICAL DEVELOPMENT ENGINEER with H.N.C. or equivalent experience on development of electrical equipment is required to work in conjunction with mechanical engineers on equipment being used in prototype and field installations.

(3) SENIOR ELECTRICAL EXPERIMENTAL ENGINEER with H.N.C. or equivalent experience is required to take charge of a small laboratory for investigating electrical circuits and equipment prior to final design being completed, together with testing of final designs and modifications.

(4) ELECTRICAL LIAISON ENGINEER with H.N.C. or equivalent experience is required to investigate electrical problems with equipment suppliers and field installation engineers.

(5) ELECTRICAL DESIGN ENGINEERS with O.N.C. or equivalent experience are required for detail design from basic specifications.

(6) ELECTRICAL DRAUGHTSMEN required for general design, productions and development work.

(7) SENIOR JIG & TOOL DRAUGHTSMEN with O.N.C. or equivalent backed by tool room and drawing office experience.

These are permanent and progressive posts in an expanding industry. Successful applicants from the Greater London area can be assisted with housing. Applications to Dept. C.P.S., 336/7, Strand, London, W.C.2, quoting ref. 1360. 5146

UNIVERSITY OF BIRMINGHAM

Electrical Engineering Department

APPLICATIONS are invited for a Grade II Lectureship for the Session 1954-1955. Salary £550-£1,100, according to qualifications and experience. There would be some preference for a candidate with experience of teaching of the theory of alternating currents and electrical machines.

Applications (3 copies) with the names of three referees should reach the Registrar, The University, Birmingham, 15, not later than 29th September, 1954. Further particulars from undersigned.

C. G. BURTON,
Secretary.
The University,
Birmingham, 15. 5219

TRINIDAD AND TOBAGO ELECTRICITY COMMISSION

APPLICATIONS are invited to fill the post of POWER STATION CHEMIST, PORT OF SPAIN.

Candidates must possess a B.Sc. degree obtained at a recognised university or be an Associate of the Institute of Chemistry. The duties of this post consist mainly of the sampling and analyses of fuels, oils and waters, the control of boiler fuel water and cooling water treatment, and the analyses of deposits, etc., and all other chemical investigations as the Commission may require. Knowledge and experience of the chemical control of power station plant and materials and of the allied aspects of metallurgy are essential. Experience of combustion efficiency would be an additional advantage.

The yearly salary is £1,100, rising by increments of £27 10s. to £1,182 10s. These salaries apply until the total units sold reach 100 MW hours. The salary range will then be £1,210 to £1,292 10s. To these salaries a temporary cost-of-living allowance of £25 a year is also added. A house allowance based on salary received, but not to exceed £10 8s. 4d. per month, if married, and £6 5s. per month, if single, is also payable, and an outfit allowance of £60 will be granted on arrival.

The successful candidate will be required to pass a medical examination and will be provided with first class passages for himself, his wife and two children up to the age of 18, on appointment. Leave passages to the U.K. or equivalent will be provided every three years. Vacation, casual and sick leave on full pay.

General details of Trinidad's climate, income tax, etc., can be obtained from the West India Committee, at 40, Norfolk Street, London, W.C.2.

Applications, giving full details of qualifications, experience and personal particulars, together with two recent references, should be sent by air mail to reach the Acting General Manager, Trinidad and Tobago Electricity Commission, P.O. Box 121, Port of Spain, Trinidad, B.W.I., on or before Monday, 1st November, 1954. 5145

UNIVERSITY OF WESTERN AUSTRALIA

APPLICATIONS are invited for the position of LECTURER IN ELECTRICAL ENGINEERING.

Applicants should hold a degree in Engineering and preference will be given to an applicant with experience or interest in some aspect of heavy power electrical engineering such as modern methods of system analysis or some aspect of electrical design.

The salary range, which is under review at present, is £859-£50-£1,259 (Australian) per annum, which includes a present cost-of-living allowance of £259. According to qualifications and experience an appointment may be made within the range.

An allowance is made towards travelling expenses.

The successful applicant will be expected to commence duties as early as possible in 1955.

Further particulars and information as to the method of application may be obtained from the Secretary, Association of Universities of the British Commonwealth, 5, Gordon Square, London, W.C.1.

The closing date for the receipt of applications, in Australia and London, is 30th October, 1954. 5156

SENIOR CABLE ENGINEER

JOHNSON & PHILLIPS require the services of a SENIOR CABLE ENGINEER in the Test and Research Department. The position involves responsibility to the Research Manager for the supervision of all research and development work on all types of power cables. A good all-round experience of the manufacture, design and installation of power cables for all voltages is essential. Experience of gas pressure and oil-filled cables is also required. Experience in the design of cable accessories would be an added advantage.

The position will carry a good salary and good prospects.

Full details of training, qualifications and experience to date should be given. Apply Employment Manager, Victoria Way, Charlton, London, S.E.7. 5183

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following posts:—

SENIOR DRAUGHTSMEN, GENERATION CONSTRUCTION DEPARTMENT (Mechanical) at DIVISIONAL HEADQUARTERS. Salary Schedule D, Grade 4, £704-£819 per annum. The commencing salary (which includes London weighting) will depend upon experience and qualifications.

Applicants should preferably have experience in generating station plant layout and design of pipework, coal, ash and dust handling systems, etc.

STATION SHIFT CONTROL ENGINEER, IPSWICH GENERATING STATION. Salary Class D, Grade 10, £531-£547 per annum.

Applicants should have reached the standard of O.N.C. in Electrical Engineering or its equivalent, have experience in the operation of a switchboard at a generating station, and be fully conversant with high-voltage switching operations and protective systems.

JUNIOR ENGINEER, CLIFF QUAY GENERATING STATION. Salary Class K, Grade 19, £402 p.a., to Grade 15, £545 p.a. Commencing salary depending upon qualifications and experience.

The duties of the successful applicant will include assisting in the control room on shift and other operation and investigation duties. Preference will be given to applicants who have had previous experience in a generating station and who have reached the standard of the Ordinary National Certificate in Electrical Engineering or its equivalent.

Applications, stating age, qualifications and experience, should be sent to the Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, London, N.14, by 2nd October, 1954.

W. N. C. CLINCH,
Controller. 5167

BRITISH ELECTRICITY AUTHORITY

Yorkshire Division

GENERAL ASSISTANT ENGINEER (Civil) required in the Generation Construction Department, Sheffield. Applicants should preferably be University Graduates or persons with equivalent qualifications and have some experience of civil engineering and/or building work. Duties will be to assist in the design and construction of power stations, including the preparation of drawings and specifications and the examination of tenders.

Conditions of service and commencing salary in accordance with the National Joint Board Agreement, Class AX/EX, Grade 8, i.e., within the range £501-£639 per annum, according to experience and qualifications, rising to an ultimate maximum of £714 per annum.

Application forms obtainable from the Divisional Secretary (Establishments), British Electricity House, St. Mary's Road, Leeds, 7, to whom completed forms should be returned within 10 days of the appearance of this advertisement.

G. A. VOWLES,
Divisional Controller.
5204

BRITISH ELECTRICITY AUTHORITY

COMBUSTION and Fuel Technology Sub-Branch, Headquarters, London, require a SCIENTIST to act as junior assistant to the scientific adviser on problems concerned with combustion in boilers and atmospheric pollution. The duties will not include laboratory work but will be mainly analytical and reporting of information and after suitable training, microscopy. Candidates should be qualified chemists with a University Degree or Corporate Members of the Institution of Chemical Engineers or the Royal Institute of Chemistry. Experience of power station practice will be an advantage, but is not essential. Salary N.J.B. (General Assistant Engineer), Grade 5, £558-£796 inclusive. Applications stating age, present position and salary and giving full details of training, qualifications and experience, to D. Moffat, Director of Establishments, Winsley Street, London, W. 1, by 8th October, 1954. Quote Ref. ER/525. 5213

ELECTRICAL ENGINEERS

required by the CENTRAL ELECTRICITY BOARD, MALAYA. Salary scale (including expatriation pay and present temporary allowance at rate for single men) equivalent to £1,197 rising to £2,100 a year. Commencing salary according to qualifications and experience. Additional temporary allowances totalling £210/£399 a year (married men) and £301/£630 (family men).

Option of appointment either (A) on agreement for three years with prospect of permanency or (B) on contract for three years with gratuity of £200 or £280 for each year's service according to salary. Opportunity of terminating appointment after one year's service. Free passages. Liberal leave on full salary.

(A) MECHANICAL ENGINEER (M2C/30065/EF). Candidates must have served an apprenticeship with a firm of diesel engine manufacturers and have had not less than five years' experience on erection and/or maintenance of engines and power plant. They should have a knowledge of A.C. electrical generators of types normally driven by diesel prime movers. Preference will be given to candidates possessing a 1st Class M.O.T. Diesel Certificate.

(B) ELECTRICAL ENGINEER (DISTRIBUTION) (M2C/40440/EF). Candidates must have had sound training in both electrical and mechanical engineering with experience in the operation of medium electricity supply undertakings, and possess a competent knowledge of the maintenance of high and low tension overhead and underground A.C. distribution systems and substation plant. They should preferably be Corporate Members or Graduates of the Institution of Electrical Engineers or possess degrees or other qualifications carrying exemption from the Institution's Graduate examination.

Write to the Crown Agents, 4, Millbank, London, S.W.1. State age, name in block letters, full qualifications and experience, and quote reference number stated against post applied for. 5155

PERSONNEL FOR MIDDLE EAST STATE

A PROGRESSIVE MIDDLE EAST State invites applications for the following additional European personnel on their permanent staff.

ONE FULLY QUALIFIED TRANSMISSION AND DISTRIBUTION ENGINEER. Applicants must possess technical and practical qualifications to H.N.C. (Corporate Membership of the Institution of Electrical Engineers an advantage), with training and subsequent experience fitting them to take charge of and maintain substations and expanding mains distribution network up to 33 kV in townships and rural districts. Age limit 38.

TWO ASSISTANT TRANSMISSION & DISTRIBUTION ENGINEERS. Qualified to H.N.C. or Graduate Institution of Electrical Engineers, with experience in operation and maintenance of 33-kV transmission lines, cables and standard L.T. distribution systems. Experience in cable jointing up to 11 kV an advantage. Age limit 35.

ONE POWER STATION SUPERINTENDENT. Applicants must be fully qualified mechanical engineers able to take charge of power station operation and maintenance. First class qualifications in steam boiler/turbine generator operation necessary, experience with diesel/gas engine generators and gas-fired/steam boilers desirable. Age limit 38.

FOUR SHIFT ENGINEERS. Applicants must hold H.N.C. or equivalent qualifications, with experience in the operation of diesel/gas engine generators and associated auxiliaries. Experience of control room operation and steam/turbine generators would be an advantage. Age limit 32.

These appointments carry attractive salaries and conditions and generous home leave. There is also a provident fund. Applications stating age and details of experience should be forwarded to—Box 5185.

TRANSFORMER DESIGNER

required by well-established transformer manufacturers in North West London area. Experience in all types of transformers up to 20 kVA essential.

Permanent progressive position, pensions scheme and life assurance. Write stating age, experience and salary required.—Box 5006.

SOUTH WEST SCOTLAND ELECTRICITY BOARD

Glasgow Sub-Area

APPLICATIONS are invited for the position of DISTRICT ENGINEER, WESTERN DISTRICT.

Applicants should have a sound engineering training and subsequent experience with underground H.V. and L.V. distribution systems, including the maintenance and operation of H.V. and L.V. switchgear, fault location on H.V. and L.V. cables and testing and protection gear. Corporate Membership of the Institution of Electrical Engineers or equivalent qualification would be an advantage.

Salary scale £912/£951 per annum, Class F, Grade 3, National Joint Board Agreement.

The appointment will be superannuable under the British Electricity Authority and Area Boards Superannuation Scheme.

The successful candidate will require to reside within reasonable distance of District Headquarters.

Application should be made on form to be obtained from the undersigned and should be completed and returned to me not later than Saturday, 9th October, 1954.

A. KELSO,
Manager.

75, Waterloo Street,
Glasgow, C.2. 5168

CHARTERED ELECTRICAL ENGINEER

required by a large retail organisation of national repute, to advise the Chief Architect, to whom he will be directly responsible, on the design, installation and general work concerning the lighting of shops. Previous experience of modern lighting design is essential and a knowledge of heating and ventilating would be an advantage. Age not over 40. Salary £1,500 or higher will be offered according to experience. The post is pensionable.

Applications, by letter only, giving full details of experience, should be addressed to:—

The Secretary
THE PROFESSIONAL ENGINEERS APPOINTMENTS BUREAU
9, Victoria Street, Westminster, London, S.W.1

5117

SEMI-CONDUCTORS

THE following personnel are required for development of new types of transistors and other semi-conducting devices, improvements of existing types and development of methods of manufacture:—

DEVELOPMENT ENGINEERS, for work on development and engineering control of production of semi-conducting devices. Qualifications science or engineering degree, preferably with factory experience.

EQUIPMENT ENGINEERS, for development of equipment for assembly and testing. Qualifications engineering degree or H.N. Certificate, preferably with factory experience.

DRAUGHTSMEN, for jig and tool design and machine layout work.

RADIO MECHANICS, for building, calibration and servicing of test equipment, including V.H.F.

Applications, stating age, qualifications and previous experience, to the Superintendent, British Thomson-Houston Co. Ltd., Lutterworth, Rugby. 5034

BRITISH ELECTRICITY AUTHORITY

South West Scotland Division

requires an ASSISTANT ENGINEER (Instruments) at Braehead Power Station, Renfrew. Salary £641-£667. Experience in the maintenance, testing and calibration of instruments and automatic electric gear in power stations essential.

Application forms from the Divisional Secretary, 168, Broomhill Drive, Glasgow, W.1, to be returned before the 4th October, 1954. 5222

BRITISH ELECTRICITY AUTHORITY

Midlands Division

THIRD ASSISTANT ENGINEER (SITE) is required in the Mechanical Engineering Section of the Construction Department at Walsall Power Station, and on its completion at another power station in the Midlands Division. N.J.B. service conditions, superannuable appointment, salary within Schedule C, Grade 5 of the agreement, commencing in range £649 to £790, ultimately rising to £858 per annum.

Applicants should have received a sound technical education with practical training, and previous constructional experience in the erection of boilers, turbines and ancillary plant; appropriate technical qualifications an advantage.

Apply, quoting Vacancy No. 764MD, on form AE6, available from the Establishments Officer, 53, Wake Green Road, Moseley, Birmingham, 13 by 19th October, 1954. 5214

ADMIRALTY— ROYAL NAVAL SCIENTIFIC SERVICE

EXPERIMENTAL OFFICERS and ASSISTANT EXPERIMENTAL OFFICERS required in Experimental Establishments in London, Portsmouth and Weymouth areas, Gloucestershire and Scotland. The majority of the posts are for Engineers and Physicists (particularly with Electronics).

Candidates must be British subjects. Qualifications, minimum of H.S.C. (pass degree, H.N.C. or near equivalent an advantage).

London salary (men): E.O. £720-£890; A.E.O. (according to age) £290-£645. All appointments are unestablished, but with some opportunities to compete for established posts.

Application forms from M.L.N.S., Technical and Scientific Register (K), 26, King Street, London, S.W.1, quoting A.247/52A. 206

CONSULTING ENGINEERS

APPLICATIONS are invited for an appointment as a SENIOR ELECTRICAL ENGINEER to take full charge of Electrical Department.

Candidates must be fully qualified and thoroughly experienced in all branches of lighting and power designs and layouts. Able to deal direct with clients and contractors, prepare designs, specifications, bills and final accounts, visit sites and carry out all tests.

Salary £1,000-£1,200 per annum.

A car will be provided for the sole use of the successful candidate.

Applications, in writing, must give full details of age and experience.

J. H. COOMBS & PARTNERS
Consulting Engineers
Thames Corner, Sunbury-on-Thames, Middx.

7640

ADMIRALTY, LONDON

ELECTRICAL DRAUGHTSMEN required in Aircraft Maintenance and Repair Department. Candidates must be British subjects at least 21 years old and have had basic electrical training (preferably apprenticeship) and practical experience of maintenance and repair of aircraft electrical installations and radio or electrical equipment. Experience also in electronics preferred.

Salary according to age, qualifications and experience within £420-£670 p.a. Overtime payable. Annual leave 24 days, 28 days after three years. Prospects of establishment.

Apply, stating age, technical qualifications and full details of experience, to any Employment Exchange, quoting Bath 474. 5143

SOUTH EAST SCOTLAND ELECTRICITY BOARD

Assistant Engineer, Central Sub-Area, N.J.B. F.7 (£697-£718)

APPLICANTS (possessing Higher National Certificate and preferably Corporate Membership of I.E.E. or equivalent) should have considerable knowledge and experience in the maintenance and construction of H.V. and L.V. overhead and underground networks and substations. Full details of qualifications and experience should reach the Sub-Area Manager at St. Ninians Road, Stirling, not later than Friday, 1st October, 1954. 5211

SOUTHERN ELECTRICITY BOARD

Assistant Engineer (Maintenance and Operation)

GREENFORD District of No. 1 (Southall) Sub-Area. Salary N.J.B. Class F, Grade 7 (£731 17s. per annum, including London weighting). N.J.B. conditions of service.

The duties of the post will be the maintenance and operation of switchgear, transformers and cables up to and including 11 kV. The appointment will involve standby duties.

The successful candidate will be required to contribute to the B.E.A. and Area Boards Superannuation Scheme, if eligible.

Applications on forms obtainable from the Sub-Area Secretary, 2/6, Windmill Lane, Southall, Middlesex, and returned to him in envelopes suitably endorsed, not later than 8th October, 1954. 5212

ADMIRALTY— ROYAL NAVAL SCIENTIFIC SERVICE

SENIOR SCIENTIFIC OFFICERS and SCIENTIFIC OFFICERS required in Experimental Establishments in London, Portsmouth, Weymouth and Gloucestershire areas and Scotland. The majority of the posts are for Engineers and Physicists (particularly with Electronics).

Candidates must be British subjects with an appropriate first or second class honours degree or equivalent high professional attainments.

Salaries: S.S.O. (M) £975-£1,150; S.O. (M) £470-£855. London rates. Somewhat lower in Provinces. All appointments are unestablished (with F.S.S.U.), but with some opportunities to compete for established posts.

Application forms from M.L.N.S., Technical and Scientific Register (K), 26, King Street, London, S.W.1, quoting A.246/52/A. 207

BRITISH ELECTRICITY AUTHORITY

South Wales Division

Vacancy No. 95/54

APPLICATIONS invited for superannuable N.J.B. appointment of FIRST ASSISTANT STATION CHEMIST, Newport Power Station. Salary F.9, £607-£629 per annum.

Degree in chemistry or equivalent and experience in water treatment, coal and oil testing and corrosion problems desirable.

Application forms obtainable from Secretary, South Wales Division, British Electricity Authority, Twyn-y-fedwen Rd., Gabalfa, Cardiff, to be returned by 8th October, 1954. 5205

DESIGNER-DRAUGHTSMEN (ELECTRICAL AND MECHANICAL)

wanted for work in connection with special variable speed drives and automatic devices for newspaper printing machines. Only senior men required, preferably with similar experience. Enhanced salaries will be paid to suitable men. Canteen facilities, contributory pension scheme. Write stating experience and salary required to Witton-James Ltd., The Hyde, Hendon, London N.W.9. 5063

CONTACTOR SWITCHGEAR LTD.

ENGINEERS required for both Engineering and Estimating Departments for control gear applications up to 1,000 h.p. low and high tension.

The company operates a contributory pension scheme and will share cost of removal in approved cases.

Applicants should have completed their National Service and preferably not over 45.

Write in confidence to the Secretary, Blakenhall, Wolverhampton. 5111

CHINA ENGINEERS LTD., SINGAPORE

CONTRACT DEPARTMENT ENGINEER for Singapore required with good experience in electrical work and with strong emphasis on cable and switchgear installation supervision. Good terms and employment conditions are offered.

Applications in writing to China Engineers Ltd., 36, Jermyn Street, London, S.W.1. Suitable candidates will be interviewed in London. 5184

BRITISH ELECTRICITY AUTHORITY

HEADQUARTERS, Bankside, London, have vacancies for:—

SENIOR CIVIL ENGINEERING DRAUGHTSMEN (Grade 5).

CIVIL ENGINEERING DRAUGHTSMEN (Grade 6).

Starting salaries, according to qualifications and experience:—

Grade 5: £595-£705 inclusive.
Grade 6: £458-£595 inclusive.

Pension scheme; one Saturday morning in 4 on duty. Application forms from D. Moffat, Director of Establishments, Winsley Street, London, W.1. Quote ref. ER./522. 5144

BRITISH ELECTRICITY AUTHORITY

South Eastern Division

ASSISTANT ENGINEER (Mechanical Inspecting), Croydon B Power Station. Successful applicant will be responsible for the inspection of mechanical plant during maintenance, assessing extent of work and preparation of reports on defective plant and maintenance of records. N.J.B. conditions of service, Class J, Grade 11, £670 19s. p.a. including London allowance. Applications giving details of education, present position, experience, etc., should be received by the Station Superintendent, Croydon B Power Station, Beddington Farm Road, Croydon, Surrey, not later than 4th October, 1954. 5220

AIR MINISTRY

require in London, provinces and overseas ELECTRICAL ENGINEERING DRAUGHTSMEN in WORKS DEPARTMENT, experienced in preparation of schemes for illumination and electrical equipment of buildings or in electrical distribution H.V. and M.V. Salaries up to £780 p.a., starting pay dependent on age, qualifications and experience. Overtime or extra duty allowance payable. Promotion prospects. Posts non-pensionable with long term possibilities. Natural born British subjects only.

Write, stating age, qualifications, employment details, including type of work done, to Ministry of Labour, 236, Walworth Road, London, S.E.17, quoting Order 85.AS. 205

DRAUGHTSMEN

SENIOR AND JUNIOR MECHANICAL, ELECTRICAL, CHEMICAL ENGINEERING AND BUILDING REQUIRED FOR EXPANDING RAYON YARN PRODUCTION PLANT. Permanent employment, good conditions and prospects for suitable applicants. Salary according to qualifications and experience. Five-day week, Pension Scheme, Canteen and Sports and Social facilities.

Applications giving full particulars in writing, to the Personnel Manager,

BRITISH ENKA LTD.,
AINTREE, LIVERPOOL. 5216

METROPOLITAN-VICKERS ELEC. CO. LTD.

require DESIGN DRAUGHTSMEN for METALCLAD and HIGH VOLTAGE SWITCHGEAR DEVELOPMENT.

Senior and junior positions available according to experience.

Applications, giving details of experience, age, etc., should be addressed to the Personnel Manager, Metropolitan-Vickers Elec. Co. Ltd., Trafford Park, Manchester, 17.

4912

APPLICATIONS are invited from engineers with experience in the cable industry for vacancies in the sales organisation of a large, old-established, London cable making company. The duties will involve a large amount of travelling and possibly tours abroad from time to time. Candidates should state their age, details of their education, experience and salary required. All applications will be treated with strict confidence.—Box 5228.

ARMATURE winder required, excellent conditions and rates, 20 mins. from Waterloo. —Max Arc & Electrics Ltd., Terrace Road, Walton-on-Thames, Surrey. 170

A WELL-known firm of electrical component manufacturers require able young man to take charge of small assembly section. Some electrical knowledge and ability to control female staff is essential. Modern factory in Wandsworth (London). Write, giving full details of experience, age and salary required, to—Box 94.

ALKALINE BATTERIES Ltd., of Redditch, are the largest makers in the Empire of alkaline accumulators, miners' lamps and emergency lighting systems, which are in rapidly growing use particularly for export. The company has vacancies in its technical sales and development sections for graduate electrical engineers, not over 30 years of age, or for men nearing the end of their degree course who have completed National Service. The posts are pensionable and offer the prospect of executive rank. Applications with full educational details and experience should be addressed —Commercial Manager, Alkaline Batteries Ltd., Union Street, Redditch. 3936

AGENTS required by well-known domestic appliance manufacturers to cover all areas of the British Isles. Wide experience of the wholesale trade, electricity boards and local authorities essential. Remuneration by nominal retainer and commission. Must be car owner. Position offers vast scope to successful applicants. Present staff notified.—Box 5186.

AN opportunity occurs in progressive manufacturing concern in London area for engineer aged 25/35 with electrical or physicist degree, on development and research work on high frequency telecommunication cable and associated testing equipment. Salary will be commensurate with qualifications and experience. Apply, giving full particulars, to—Box 4962.

APPLICATIONS are invited from persons with production experience in the radio components industry for a supervisory position in a large and expanding company in South London. The position requires a person with good technical background and a practical outlook; able to deal with varied production problems in co-operation with existing staff. The post is pensionable and offers excellent prospects to the right man. Write, giving full particulars and salary required, to—Box 5157.

ASSISTANT electrical engineer required by London consulting engineers for preparation of drawings and specifications for electrical installations in all types of buildings. Write giving full details of experience, age and salary required to—Box ER586, L.P.E., 55, St. Martin's Lane, London, W.C.2. 5065

ASSISTANT for design of electric motors and generators with H.N.C. in Electrical Engineering or equivalent.—Higgs Motors, Witton, Birmingham. 5235

AUTOPHONE Limited require qualified development engineer (degree or equivalent) for interesting and varied work on telephone and electronic equipment. Design and practical experience essential. Write fullest particulars to—539, Wandsworth Rd., London, S.W.8. 5187

CHIEF tester required for transformer division. Applications are invited from test engineers with experience in testing transformers of up to and including 60 MVA at 132 kV. Qualifications to Higher National Certificate (Electrical) essential. Please apply with full details of education, training, age, salary, etc., to—The Chief Personnel Officer, Brush Electrical Engineering Co. Ltd., Loughborough, Leics. 5190

CONSULTING engineers require electrical designer-draughtsman, age twenty-four to thirty-five. Experienced in all classes of lighting and power installations for hospitals, schools, industrial projects; preparation of contract and specifications, etc.; good draughtsmanship essential. Reply to—A. F. Myers & Partners, 147, Victoria Street, London, S.W.1. 5046

CROMPTON PARKINSON Limited invite applications from graduate physicists or electrical engineers with good honours degrees to work in their lamp works development laboratory on general lamp problems. Applicants with or without experience will be considered. Good prospects to a man wishing to make a career in industry. Superannuation scheme to which company contributes. Send full particulars of education and any practical experience to—Ref. LLD, Crompton Parkinson Limited, Guiseley, Nr. Leeds. 4627

DESIGNER required for work on medium and high-voltage power factor correction and furnace capacitors. Must have degree or H.N.C. or the equivalent in electrical engineering, and experience in the design and manufacture of medium/heavy electrical equipment. Good prospects. Write, giving full details of qualifications, age and salary required, to—The Technical Director, A. H. Hunt (Capacitors) Ltd., Bendon Valley, London, S.W.18. 71

DRAUGHTSMAN, electrical, with experience of A.C. and D.C. automatic motor control gear. Altrincham district. State qualifications and salary required.—Box 5161.

DRAUGHTSMAN required at the Rugby works of the British Thomson-Houston Co. Ltd. for layout and detailing of A.C. and D.C. motors and generators. Experience not essential. Progressive position for man of ability. Apply to—Chief Draughtsman, Motor Drawing Office, The British Thomson-Houston Co. Ltd., Rugby. 5048

DRAUGHTSMAN required, capable of designing, with minimum of supervision, electrical engineering installations for all types of buildings. 5-day week. Salary dependent upon age and experience. Apply, with details, to—J. Stinton Jones and Partners, Consulting Engineers, 21, Gloucester Place, London, W.1. 5035

DRAUGHTSMAN required for design and detail work on electrical/mechanical apparatus. Should be at least of H.N.C. standard. Workshop experience essential. Apply in writing to — Personnel Manager, A. H. Hunt (Capacitors) Ltd., Bendon Valley, Garratt Lane, London, S.W.18. 41

DRAUGHTSMAN required for detail work on specifications necessary for manufacture of paper capacitors. Write or call—A. H. Hunt (Capacitors) Limited, Bendon Valley, Garratt La., Wandsworth, London, S.W.18. 95

DRAUGHTSMEN. Previous experience in motor control equipment circuit work helpful but not essential if applicants are up to O.N.C. standard. Good salary and prospects. For successful applicants requiring housing accommodation, assistance may be given for skilled and key personnel. Pension scheme; 5-day week; canteen. Details of age, experience, qualifications and commencing salary to —Personnel Officer, Dewhurst & Partner Ltd., Inverness Road, Hounslow, Middx. 5159

DRAUGHTSMEN required. Excellent opportunity to broaden experience with well-established company, whose wide range of products avoids restrictive specialisation. There are vacancies for seniors and juniors with at least Ordinary National Certificate. On well served transport routes. Near City centre and amenities. Saturday interview if required. Apply—Marconi Instruments Ltd., Longacres, Hatfield Road, St. Albans. 5012

DRAUGHTSMEN required for mechanical design of compressed air components. Some mechanical experience essential. Applications, giving details of experience, age, etc., should be addressed to the Personnel Manager, Metropolitan-Vickers Elec. Co. Ltd., Trafford Park, Manchester, 17. 4913

DRAUGHTSMEN, senior and junior, required, with experience of power transformers. Experience on on-load voltage regulators an advantage. Good salary, rates above the A.E.S.D. minimum, contributory pension scheme. Apply stating age, experience and salary required to—Brentford Transformers Ltd., Kidbrooke Park Rd., London S.E.3. 5047

DRAUGHTSMEN, sound experience of switchgear, required by consulting engineers for work in Manchester and Chester. Good salary, pension scheme, living allowance. Please write, giving full particulars of experience and qualifications, to—Box 4967.

DRAUGHTSMEN, sound knowledge of electrical engineering, required by consulting engineers for permanent positions in their Bath offices. Good salary, excellent conditions, pension scheme. Please write, giving full particulars of experience and qualifications, to—Box 4968.

ELECTRIC cable manufacturers require an assistant in their testing and quality control dept. Knowledge of both rubber and plastic technology is absolutely essential. Permanent pensionable position. Apply in writing giving full details of experience, salary, age, etc., to the Secretary, British Driver-Harris Co. Ltd., Gaythorn Mill, Albion Street, Manchester, 15. 5238

ELECTRIC cable manufacturers require an assistant foreman for their extruding dept. Knowledge of both rubber and plastic technology is absolutely essential. Permanent pensionable position, apply in writing giving full details of experience, salary, age, etc., to the Secretary, British Driver-Harris Co. Ltd., Gaythorn Mill, Albion Street, Manchester, 15. 5239

ELECTRICAL contractor (London) has vacancy for estimator used to large contracts, capable of handling them from enquiry to completion. Exceptional opportunity for experienced man able to accept responsibility. Applications will be treated confidentially. State age, salary, with concise particulars of experience.—Box 5018.

ELECTRICAL contractors require for provinces, assistant engineer, good electrical contracting experience and knowledge of estimating essential. Applicants should write giving experience, salary and references.—David Thomson Electrical Engineers Limited, Albion Road, Luton, Beds. 7639

ELECTRICAL contractors, London area, require experienced estimator/supervisor. State age, experience and salary required.—Box 5148.

ELECTRICAL draughtsman required for interesting work on instrument, lighting and power installations; post carries a good salary and excellent working conditions for the right person, who must produce evidence of his ability to work on his own and of technical training to at least Higher National Certificate standard. Reply giving full details to—Chief Engineer, Murex Ltd., Rainham, Essex. 5169

ELECTRICAL draughtsman, 25-30, conversant with all kinds of installations for post in London. Five-day week. Write stating education, qualifications, age, experience and salary required, to—The Secretary, Drake & Gorham (Contractors) Limited, 36, Grosvenor Gardens, London, S.W.1. 5229

ELECTRICAL engineer required, age 25 to 35, capable of designing and supervising electrical engineering installations for all types of buildings. Apply, with details of experience and salary required, to—J. Stinton Jones and Partners, Consulting Engineers, 21, Gloucester Place, London, W.1. 5036

ELECTRICAL engineer required in Peterborough area. Applicants should have a good education of at least Higher National Certificate level. Capable of designing conventional multi-motor control panels for machine tools in prototype stage. Knowledge of electronic control an advantage but not essential. Responsible for electrical installation and plant maintenance. Commencing salary £875 p.a. Appy giving full details to—Box 5170.

ELECTRICAL engineer with university degree or equivalent qualification required for development work on rubber and plastic insulated cables, with particular emphasis on telecommunication and radio frequency applications. Experience in cable manufacture desirable but not essential. Salary in accordance with experience and qualifications. Apply to—The Secretary, W. T. Glover & Co. Ltd., Trafford Park, Manchester. 5149

ELECTRICAL engineer/draughtsman required for interesting work on large chemical plant installations. Applicants should have some works experience in heavy industry and technical ability to deal with a large variety of problems. Duties include the preparation of power and lighting schemes. Generous salary commensurate with experience and ability. Offices situated in Euston Road, London, N.W.1. Five-day week and superannuation scheme in force. Applications, which will be treated in confidence, should give previous experience and qualifications and be addressed to—Chief Draughtsman, Laporte Chemicals Limited, Kingsway, Luton, Bedfordshire. 5236

ELECTRICAL fitter and wireman, experienced on power boards and telecommunications contracts. State experience and wages required.—Troughton & Young (Manufacturers) Ltd., 18, Beddington Farm Road, Purley Way, Croydon (Tel. Croydon 6892). 5050

ELECTRICAL foreman required for large electric cable factory in Manchester. Good working knowledge of the operation of A.C. and D.C. machinery necessary, together with experience of modern installation practice. Must be experienced supervisor. Some technical qualifications would be an advantage. Please send details of experience, previous employers, age, etc., to—Box 5171.

ELECTRICAL foreman required for maintenance of high-voltage switchgear, motors, cables, control gear, etc. Commencing salary £505 per annum (range £505/£20/£665). Contributory pension scheme. Apply in writing stating age and experience to—Chief Engineer, The Colne Valley Water Company, Aldenham Road, Watford, Herts. 5150

ELECTRICAL machine designer. A. Reyrolle & Company Ltd. have a vacancy in their rotary equipment department for an engineer to assist in the design and development of A.C. generators and motors, including commutator motors. Applicants should have had training and experience in this class of work and should possess at least the Higher National Certificate in Electrical Engineering. Preference will be given to Corporate Members of the Institution of Electrical Engineers. Please apply with full particulars to—The Chief Engineer, A. Reyrolle & Company Ltd., Hebburn, Co. Durham. 5188

ELECTRICAL wholesalers require storesman. Previous experience desirable. Permanent position. — London Electrical Co., 92, Blackfriars Road, London, S.E.1. 5038

ELECTRICIAN for London retail electrical business of good standing. Good position for capable man with high standard of service. State age and details of experience.—Box 7642.

ELECTRICIAN wanted, one used to high-class work, for London contractor. Permanency. Write stating age and experience to —Box 5067.

ELECTRONIC/electrical engineer required to take charge of small laboratory. Applicant must have some years' experience in laboratory of manufacturers or large scale users of any of the following: cables, capacitors or insulation materials. Maximum age 35. London, E.11 area. Write fullest particulars.—Box 4915.

ELECTRONIC engineers required. Excellent opportunity for men of degree standard to broaden experience in a field of great interest and variety and involving latest techniques. Restrictive specialisation can be avoided by joining Marconi Instruments Limited who produce light current communications, measuring and test apparatus for a wide range of requirements. Saturday interview if required. Apply Marconi Instruments Ltd., Longacres, Hatfield Road, St. Albans. 5014

ENGINEER required for an engineering department dealing with the application of heating elements to various industrial and domestic processes. A knowledge of heating elements is not essential as a training period will be given. Applicants must have at least Higher National Certificate in Electrical Engineering and be aged 25-35. Salary according to age, qualifications and experience. Write giving full details to the Personnel Manager, Metropolitan-Vickers Electrical Co. Ltd., Trafford Park, Manchester, 17. Mark envelope "Heating Element." 5128

ENGINEER/manager required for South Coast branch of electrical contractors. Must be competent estimator and able to supervise administrative side of business. Applicants should state details of training, previous positions held and salary required.—Box 5172.

ESTIMATING and supervising engineer required (additional), electrical contractor, Inner London. Good experience essential. Pension scheme. Please write stating full experience and salary required to—Box 7633.

ESTIMATOR as assistant to contracts manager required by rapidly expanding South Midlands electrical contractors. Write stating age, experience and salary required.—Box 5230.

EXPERIENCED instrument panel wiremen required S.E. London. Good prospects.—Box 7559.

HACKBRIDGE & HEWITTIC ELECTRIC Co. Ltd., Walton-on-Thames, Surrey, require the services of a research and development engineer with some experience in motor speed control as applied through mercury arc rectifiers. Apply—Research Engineer. 5207

HACKBRIDGE & HEWITTIC ELECTRIC Co. Ltd., Walton-on-Thames, Surrey, require the services of an engineer experienced in the design and production of instrument transformers and small power transformers. This is a senior position offering considerable scope. Applications should be made direct to the Chief Engineer. 5208

JOHNSON & PHILLIPS Ltd., have vacancies in their transformer department for transformer draughtsmen having experience in all sizes up to 1,000 kVA. In addition vacancies exist for men having experience in sizes 1,000 kVA to 30,000 kVA and the higher voltages. Applicants should state age, training and experience, together with salary required, to—Employment Manager, Johnson & Phillips Ltd., Victoria Works, Charlton, London, S.E.7. 4931

JUNIOR engineers required for cable installation contracts throughout Gt. Britain. Must be prepared to travel. Permanent employment, good conditions.—Box 5206.

KEEN young sales engineer required as Midlands representative by manufacturers of all forms industrial M.V. switchboards, cubicles, control panels, substation switchboards, feeder pillars, etc., with full range heavy duty combination fused switches to 800 amps. and full industrial and domestic range of fusegear. Give details of experience in confidence to—Managing Director, Dennis Switchgear, Fleming Road, Speke, Liverpool. 5091

LEADING oil company requires one electrical engineering draughtsman for work in the Middle East. Age 25-30 years. Candidate should possess the Ordinary National Certificate in Electrical Engineering or have equivalent qualifications. An engineering apprenticeship is required which includes 3 years' practical experience in the shops followed by 3-5 years in the drawing office on electrical installations for process plants, workshops and/or factories. Overseas allowance in local currency, free passages out and home, free medical attention, kit allowance, good leave arrangements. Pension scheme. Write, stating age and full details of qualifications, quoting F.500, to—Box 1240, c/o 191, Gresham House, London, E.C.2. 5173

LONDON TRANSPORT require trainees in railway signalling design. Minimum qualification Ordinary National Certificate in Electrical Engineering or equivalent. After three months' training candidates on passing examination appointed as technical assistants in drawing office of signal engineer. Salary £364 10s. at 21 rising to £613 10s. per annum subject to age and satisfactory service, with additional payments for certain recognised qualifications; medical exam. Applications to Staff Officer (F/EV.500), London Transport, 55, Broadway, London, S.W.1. For acknowledgement enclose addressed envelope. 5160

MAINS engineer required to take charge of the mains and substations in a rapidly expanding township in the Middle East. Duties would include planning, construction and maintenance of H.V. and L.V. systems, comprising underground cables and overhead lines. Candidates should be between 30 and 40 years and should have the degree of B.Sc. or equivalent and be Corporate Members of the Institution of Electrical Engineers, and should have had at least 10 years' experience with senior responsibility in a similar position. Commencing salary would be £2,500 p.a. plus other emoluments. All applicants would require to undergo a medical examination. Reply giving full details to—Box 5194.

MONSANTO CHEMICALS Limited have vacancies in London for the following classes of draughtsmen: (1) A senior draughtsman for vessel design and detail work; minimum qualification Higher National Certificate. (2) An electrical draughtsman with experience in the design of installations of electrical equipment in chemical and associated plants, including H.T. and L.T. distribution, lighting and power layouts; minimum qualification Ordinary National Certificate. (3) Draughtsmen for work on detailing of equipment, piping and plant layout for chemical works. The positions are permanent and pensionable, and good salaries according to age and experience are offered. Five-day week and lunch voucher scheme are in operation. Apply in writing, giving full details of age, training and experience, to—The Chief Personnel Officer, Monsanto Chemicals Limited, 8, Waterloo Place, London, S.W.1. 5174

OPPORTUNITY for first-class engineer to take charge of the design of power transformers above 5 MVA and up to 132 kV. Top salary will be paid to an engineer with initiative and drive and with the right experience. Excellent accommodation will shortly become available. London area.—Box 4979.

MECHANICAL engineer required by cable works for production machine experimental and development work. Minimum qualification H.N.C. Age limits 30 to 40 years. The prospects are good and this is an opportunity for a man who likes to see the results of his ideas put into practice. Commencing salary according to qualifications and experience. Pension scheme. Apply in confidence, giving particulars in chronological order, to—Works Manager, Southern United Telephone Cables Ltd., Dagenham Dock, Essex. 5056

MITCHAM WORKS Limited have vacancies for technical assistants able to carry out, without close supervision, measurements on radio and/or television receivers and associated components. These posts offer excellent opportunities for young men to enter the factory laboratory of a leading receiver manufacturer. Commencing salaries in accordance with age, experience and qualifications. Candidates, who should have academic qualifications to the standard of H.N.C., should apply in writing to the Personnel Officer, Mitcham Works Limited, New Road, Mitcham Junction, Surrey, quoting reference G.1. 5147

NETTLE ACCESSORIES Limited, Harper Road, Wythenshawe, Manchester, require representative for London, South of the Thames and London South Eastern Electricity Board area. Car owner preferred but not essential. Considerable scope. Staff pension scheme operative. Apply in strict confidence, giving details of experience, salary required, etc., to —The Sales Manager. 5052

PERSONNEL required for sales office, male or female. Superannuated position. Some previous experience necessary.—Progress Cables & Accessories Co. Ltd., Regent House, Eversholt Street, London, N.W.1 (Euston 5588). 5053

PLANNING engineer required by the Telephone Manufacturing Co. Ltd., Martell Road, West Dulwich, London, S.E.21, with experience of pre-production planning of light electro-mechanical components. Applicants should have reached H.N.C. standard and possess a sound knowledge of production methods. Staff pension and bonus schemes after qualifying period. Five-day week. Apply in writing to Personnel Department. 5192

QUALIFIED design and development engineer required by small but expanding company manufacturing control switchgear, specialising in limit, micro and rotary switches, in Birmingham area. Excellent prospects for advancement. Write stating past experience, qualifications and age to—Box 7632.

QUALIFIED electrical and mechanical engineers are required by firm of electrical and hydraulic engineers to undertake preparation of specifications and tenders for composite schemes comprising electrically, steam and diesel driven pumping machinery for waterworks, mining, industrial and power stations. Applicants must be of H.N.C. standard or above, preferably with experience of similar work. Good salary according to previous experience. Superannuation scheme for permanent staff. Write giving full particulars of age, education and experience to—Box 5175.

QUALIFIED lighting engineer for overseas branch is required by large manufacturers. Successful applicants should be capable of preparing lighting specifications, and should be prepared to spend a short period of training in London.—Box 5195.

REPRESENTATIVE for electrical wholesaler (E.W.F.) operating Bedfordshire from local branch.—Box 5196.

REPRESENTATIVE with good knowledge of high-class accessories, switchgear and small motors required in London area by The Jeary Electrical Co. Ltd., 324, Old Street, London, E.C.1 or (Phone: Mon. 8302). 4955

REPRESENTATIVES (commission) wanted having live connection with the electrical industry retail and wholesale for unique instantaneous electric water heaters, suitable for domestic and industrial use. Also immersion heaters. Please state area covered and broad particulars of connection.—Box 5234.

SENIOR electrical draughtsmen required with sound experience in power wiring and layouts for process plant essential. Applications in writing, giving full personal details, to—Ilford Limited, Romford, Essex. 5233

STOREKEEPER required by London electrical contractors. Some experience essential. Full details of experience, salary, etc.—Box 5132.

SENIOR draughtsman required for mechanical design work on electrical rotating machines for application to diesel-electric locomotives. Candidates must be fully qualified draughtsmen with H.N.C. (electrical or mechanical) and previous experience in either traction machines or industrial D.C. machines. First-class service conditions, including a non-contributory staff pension scheme, and good commencing salary. Please apply with full details to—The Chief Personnel Officer, Brush Bagnall Traction Limited, Loughborough, Leics. 5075

SENIOR experienced electrical engineers required for employment by large oil company operating in Venezuela, South America. Candidates should be between 30 and 40 years of age, possess a university degree in electrical engineering or A.M.I.E.E., and have approximately 10 years' experience in the operation and maintenance of power houses, H.T. transmission and distribution. They should have already occupied a position of senior administrative responsibility. These vacancies offer a permanent career involving overseas tours of 3 years' duration with 3 months' U.K. leave at the end of each tour. Leaves are fully paid with free passages for employee and family; local leave first and second years. Furnished accommodation supplied for single or married men. Contributory pension scheme covers both employee and family; kit allowance paid. U.S. dollar salaries in line with qualifications and experience; details given at interview. Travelling expenses paid for interview in London. Please write in confidence stating age, qualifications and full details of experience to — Box ZB.66, Deacon's Advertising, 36, Leadenhall Street, London, E.C.3. 5197

SMALL manufacturing firm in East Midlands wishes to contact gentleman, to design low-tension joint boxes and other equipment suitable for electricity or coal boards. Small catalogued connection in existence. Cash, commission or open sales agency. Details in confidence to—Box 5057.

SOUTH Africa. Established company has vacancy for shift charge hand in the paper-lapping and layup sections of its dry core telephone cable plant. Single man preferred. Pension and other welfare amenities available; passage paid. Applications should give full details of previous experience and qualifications and will be treated in confidence.—Box 5198.

STOREKEEPER required. Must have experience of electrical trade. Paddington district. State wage required.—Box No. 25, Brockie Haslam & Co., 231, Strand, London, W.C.2. 5176

SWITCHGEAR design draughtsman for mechanism and circuit breaker work required by South Wales Switchgear Ltd., Blackwood, Mon. Modern factory in excellent surroundings. Applications giving experience and qualifications to—Personnel Manager. 5074

TECHNICAL assistants (electronic). Men required of Final Certificate City and Guilds Telecommunications standard and with experience in VHF and UHF. Men with compensating experience in these frequencies can be considered. Opportunity to broaden experience and avoid restrictive specialisation. Saturday interview if required. Apply Marconi Instruments Ltd., Longacres, Hatfield Road, St. Albans. 5013

TECHNICAL representative required for Scotland by switch and control gear manufacturers. Knowledge of mining and industrial gear desirable. Apply by letter stating age, qualifications, experience and salary required.—Box 5163.

TECHNICAL sales engineer. Engineering and estimating work for automatic electrical motor control gear manufacturers. Altrincham district. State experience, age, salary. — Box 5162.

THE BRUSH Group requires a chief engineer for one of its factories engaged on the production of small rotating electrical machinery. Applicants must obviously have adequate technical qualifications and experience in this class of equipment, but administrative ability, personality, drive and ability to control design and drawing office staff will all be given their due weight. Salary by arrangement, and a non-contributory staff assurance scheme is a condition of employment. Applications, which will be treated in confidence, should be addressed to — Personnel Director, Duke's Court, Duke Street, London, S.W.1. 5189

TECHNICAL representatives required by Sunvic Controls Ltd. to sell their instruments and represent them in the process control and/or industrial and scientific instrumentation fields. Applicants should possess sufficient engineering training to understand and discuss with prospective users the application of the company's instruments. Above all they should possess a successful sales record, initiative and ability to think and report clearly and pursue logical plan of action without prompting. Write giving full details of age, experience, qualifications, etc., to—General Sales Manager, Sunvic Controls Ltd., 10, Essex Street, London, W.C.2. 4718

TELEPHONE engineer required for senior position in head office of The Reliance Telephone Co. Ltd., 43/47, Parker St., London, W.C.2. Wide experience necessary. State salary required and details of previous experience. —7641

TIME study and rate fixing engineer required by cable works. Applicants, between the ages 25 to 35 years, must have had experience in this type of work and be conversant with trade union procedure. Salary according to age, qualifications and experience. Pension scheme. Apply in confidence, giving particulars in chronological order, to — Works Manager, Southern United Telephone Cables Ltd., Dagenham Dock, Essex. 5055

TRANSFORMER designer for small transformers, etc., of all types up to 5 kVA. Experience of A.I.D. and Govt. specs. and estimating an advantage. Old-established manufacturers on South Coast.—Box 5151.

VOLEX ELECTRICAL PRODUCTS Ltd., Salford, 6, require an outside representative for London and the Home Counties. Salary, commission and expenses paid. Car provided. Applicants must have their own personal connections with wholesalers, electricity boards, consulting engineers, architects, etc., at top levels. Apply in writing, stating full qualifications, to—Sales Director. 5199

WANTED, live estimator and supervisor for electrical contractors. Man with contacts and small capital.—Box 5200.

WELL-known firm of architects, Melbourne, Australia, invite applications for senior staff appointments for their Melbourne office: (a) Structural engineer; (b) Mechanical and electrical engineer. Applicants must be members of a recognised institution and hold an engineering degree, and to have had no less than ten years' practical experience in the building industry. Successful applicants will undertake engineering and mechanical equipment design and supervision of large commercial and industrial buildings. Appointments will be for a minimum of two years, but with prospects of senior permanent position. Very good salary. Successful applicants after interview in London will receive some assistance in passage to Australia. Applications should be addressed to —Box No. 61, c/o Dawsons, 129, Cannon St., London, E.C.4. 5164

WORKING foreman required for small winding and repair shop, all types of motors up to 50 h.p. West London area. Age 40 and above preferred.—Box 5134.

YOUNG man approximately 24 years of age required to assist works manager in small coil winding business. Some technical and electrical knowledge essential. Write, stating experience and salary required, to—Box 5232.

APPOINTMENTS FILLED

Dissatisfaction having so often been expressed that unsuccessful applicants are left in ignorance of the fact that the position applied for has been filled, may we suggest that Advertisers notify us to that effect when they have arrived at a decision? We will then insert a notice free of charge under this heading.

SITUATIONS WANTED

ABLE and energetic qualified engineer, age 28, administrative and commercial experience, requires executive position at home or abroad with go-ahead firm. Conversant with electronics, rotating machinery and diesel practice. Prepared to work in fresh venture or build business in new area.—Box 7638.

BRANCH manager, elect. wholesalers, seeks situation S. coast area. Good organiser. Age 42.—Box 7637.

ELECTRICAL engineer, aged 41, holding managerial position seeks change, wide knowledge of electrical appliances and installations.—Box 7635.

CHIEF purchasing officer (44) M.P.O.A. seeks change. 20 years' experience in electrical and general engineering trades. Excellent contacts all markets, modern methods, purchase, progress, stock and stores control.—Box 7587.

ELECTRICAL engineer, age 29, experienced design, estimating, specifications, supervision, testing, measurement, billing. Internal installations and distribution. Details if required. London or S.E.—Box 7607.

MANAGER: designer-draughtsman expd. estimating and supervision all types electrical contracts, maintenance, repairs, from enquiry to completion. Office, works and stock-control.—Box 7543.

WELL-educated electrical engineer (31), A.M.I.E.E., Faraday House and B.T.H. trained, subsequently five years selling non-ring switchgear, rectifiers and transformers, seeks arduous but worth-while assignment possibly building up sales or site engineer large project or reorganising department or subsidiary.—Box 7623.

WORKING electrical supervisor, all branches, 20 yrs.' experience, City and Guilds, requires change.—Box 7625.

AUCTION NOTICES

By Order of the Liquidator, D. H. Pexton, Esq., F.S.A.A., re Palmac Engineering Co. Ltd. (in Voluntary Liquidation).

BASINGSTOKE
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VACANT POSSESSION
Leasehold SINGLE-STOREY FACTORY, approx. 4,000 sq. ft. Large yard and additional land. All services.

PLANT AND MACHINERY
Engineers' Tools, Spraying and Welding Units, Diesel and Petrol Engines to 60 h.p. DIESEL ELECTRIC POWER PLANTS, Lister, Petter and other Engine Spares, Alternators, A.C. Motors, Switchgear, Hydraulic Transporter Trucks, Trolleys, Lifting Tackle, Engineers' Stores, etc.

LEOPOLD FARMER & SONS
will sell the above By Auction on the premises
TUESDAY, 5th OCTOBER, 1954,
at 11 a.m.

Particulars and Catalogues of Messrs. Pexton & Co., 265, Strand, London, W.C.2, and Leopold Farmer & Sons, Industrial Property, Plant and Machinery Auctioneers, Surveyors and Valuers, 46, Gresham Street, London, E.C.2 (MON. 3422, 8 lines). 5165

FOR SALE

COUNTY BOROUGH OF DONCASTER

Surplus Pumping Equipment

OFFERS are invited for the purchase of the undermentioned pumping equipment:—

4 7″ dia. J. STONE & CO., Deptford, Vertical Spindle Sunturbo Pumps to pump 660 g.p.m. against 75-ft. total head, complete with steel stool to fit motor directly above pump.
4 28-b.h.p. CROMPTON PARKINSON Slipring Motors, 400 volts, 1,400 r.p.m.
4 ALLEN WEST Starters, 4-stage resistance with dash pot control.
4 7″ flanged Reflux Valves.

This pumping equipment may be inspected at the Highways Depot, North Bridge, on application to the Borough Engineer, 2, Priory Place, Doncaster.

Offers to purchase this equipment should reach this office not later than Saturday, the 9th October, 1954.

Borough Engineer's Office,
2, Priory Place, Doncaster.
13th September, 1954. 5152

ELECTRICAL EQUIPMENT (400/3/50)

80-h.p. BROOK S.R. Motor, 1,500 r.p.m., with ERSKINE HEAP S.R. Starter.
40-h.p. BROOK S.R. Motor, 400 r.p.m.
30-h.p. do., 950 r.p.m.
HEWITTIC type D.301 Bulb Rectifier.
ELLISON Breaker for D.C. travelling crane.

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131-kVA BLACKSTONE E.P.V.4, 4-cylinder, 600 r.p.m. diesel engine and 400-volt, 3-phase, 50-cycles alternator.

Engines complete with air starting equipment and electrical control gear for alternators.

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TWO 600-kW SULZER Disel Generating Sets, 440/220 volts D.C. Auxiliaries, spares, etc.

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Three 14-kW COVENTRY CLIMAX/McLURE & WHITFIELD, 230 volts D.C., 52 amps., 1,750 r.p.m. Auxiliaries, etc. Unused.

Other sets in stock.

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NEW 9-panel low-tension Switchboard by YORKSHIRE SWITCHGEAR CO.; 400/440/3/50; rupturing capacity 25 MVA; comprising one incoming, four 400-amp. capacity and three 800-amp. capacity circuit breakers and one busbar coupler; all vertical isolation draw-out type.

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Keighley 63

STEAM TURBO-ALTERNATOR SETS

3,300 volts, 3-ph., 50 cycles

FRASER & CHALMERS (G.E.C.), 2,750 kW, 6,000/1,000 r.p.m., with direct coupled exciter, 150 lb. w.p. with 6/1 reduction gear by POWER PLANT ENGRG. CO., condenser, circulating pump, etc.

CURTIS-B.T.H., 1,500 kW, 3,000 r.p.m., with direct coupled exciter. 150 lb. w.p., condenser, circulating pump, etc.—Box 4833.

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TWO 1,500-kW BRUSH Ljungstrom Turbo-Alternator Sets; working pressure 185 lb. per square inch; 6,600 volts, 3-phase, 50 cycles; 3,000 r.p.m.; complete with Surface Condenser and all ancillary equipment.

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300-h.p. MOTOR

TOTALLY enclosed, 400/3/50, 290 r.p.m., slipring, ball and roller bearings. Complete with ALLEN WEST starter. New 1951 and little used.

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Keighley 57

SHAVINGS FOR PACKAGING

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A BABCOCK & Wilcox water tube boiler will cut down your fuel costs; we can supply from stock. Two 50,000 lb. evap., 200 lb. w.p.; 3,000 lb. evap., 400 lb. w.p. Spencer-Bonecourt boiler; also marine, Cornish vertical, etc. We install complete, including brickwork.—Burford, Taylor & Co. Ltd., Boiler Specialists, Commercial Street, Middlesbrough (Tel. Middlesbrough 2622). 36

A HIGH-vacuum impregnation unit or single or batch coil impregnation service to RIC Specification 214 or individual requirements.—Blickvac, Hamilton Road Works, Hamilton Rd., London, S.E.27 (Tel. Gipsy Hill 4394). 44

A.C./D.C. meters.—The Electric Meter Co. Dept. ER46, Castle Circus House, Torquay. 7627

A.C. and D.C. house service meters, all sizes quarterly and prepayment, reconditioned guaranteed one yr. Repairs and recalibrations —The Victa Electrical Co., 47, Battersea High Street, S.W.11 (Tel. Battersea 0780). 138

A.C. and D.C. motors, all sizes, large stocks fully guaranteed. — Milo Engineering Works, Milo Road, East Dulwich, S.E.22 (Forest Hill 2278-9). 102

A.C. and D.C. motors, generators, from stock.—Service Electric Co. Ltd., Honeypot Lane, Stanmore, Middx. (Edgware 5566/9). 91

ALTERNATOR control panel cubicles, 1,000 kW, 500 kW, 250 kW, 150 kW, 3-phase, 400 volts.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 33

ALTERNATORS for sale. All sizes, voltages and frequencies up to 500 kVA. Exciters, automatic voltage regulators and switchboards available. For the most part unused and guaranteed for twelve months.—Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford, Herts. 5225a

ALTERNATORS, 2 to 30 kW, 1 and 3-ph., and D.C. generators, 300 w. to 24 kW. Lists.—Powerco Ltd., Wandsworth Town Station, York Rd., London, S.W.18 (Vandyke 5234). 151

ALTERNATORS, 3-phase, all sizes in stock from 7 kVA up to 330 kVA.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1 (CLErkenwell 5512). 33

ATLAS, twin tube, 80 w., fluo. fittings, quick-start. No. FKQ 2080. Brand new. £9 5s. ea.—J. S. Ramsbottom & Co. Ltd., Keighley. 5240

AVAILABLE, unused, Brook powerful motorised grit, dust, fume extractor-blower centrifugal fan units, £10 each. Fraction normal cost. Also larger units and ring-mounted fans (A.C. and D.C.) available. — Bellangers, 306, Holloway Rd., London, N.7 (North 4117). 7605

BARGAINS in electric motors are always being obtained from A. Cooksley & Co. Ltd., 21/25, Tabernacle Street, London, E.C.2. Stocks include A.C. and D.C. motors, second-hand and new up to 30 h.p. Starters, slide rails and pulleys. Ring Mon. 3355 for your requirements. 50

CIRCUIT breakers, various sizes in stock, A.C. and D.C., 200 amperes up to 2,000 amperes. Also dynamo and alternator switchboards.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 37

CIRCUIT breakers, 300 amps., 3-phase, 50 cycles, Crompton Parkinson clad type, floor mounting, 25 MVA rupturing capacity. Number available. — Britannia Manufacturing Co. Ltd., Britannia Walk, London, N.1 (Tel. Clerkenwell 5512). 21

CONVERTERS, 110 v. and 220 v. D.C. to 230/1/50, 0.3 to 6 kVA, from £15 up.—Powerco Ltd., Wandsworth Town Station, York Rd., London, S.W.18 (Tel. Vandyke 5234). 154

CRANE motors. Direct current, series wound or compound wound, all voltages. We have large stocks. — Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 24

D.C. meters.—The Electric Meter Co., Dept. ER46, Castle Circus House, Torquay. 7628

DUBILIER 1952, 400-volt, 3-phase, 50-cycle, 51-kVAr power factor correction condenser. One B.I.C. ditto, 12.5 kVAr.—Whitefield Machinery & Plant Ltd., Cobden St., Salford. 6 (Tel. No. Pen. 4746/1373). 4834

DIESEL alternator set, 62½ kVA, G.E. type AT1, 240/3/60, 150 amps. at 1,200 r.p.m., direct coupled to International Harvester model UD-18 6-cyl. diesel. Can be controlled at 1,000 r.p.m. for 200/3/50. Equipment available for above, 4 step-up transformers, 200/400 v., 15 kVA, by English Electric; 600-gal. fuel storage tank. Good supply of engine spares. Can be viewed and run by appointment.—Limit Engineering Co. Ltd., Windsor St., Essex Rd., Islington, London, N.1. 7619

DIESEL generating sets, English manufacture, direct current, all voltages, all sizes to 500 kW.—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1. 17

DIESEL generating sets, English manufacture, 3-phase, all sizes to 500 kW.—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1. 16

ELECTRIC cable. Heavy duty industrial TRS PILCSWAS, etc. Send for list of over 50 types at greatly reduced prices to clear warehouse.—Box 4902.

ELECTRIC generating sets for sale. Diesel, steam, petrol and gas, for lighting, power, welding, etc. Very large stocks of engines, alternators and generators held, which can be coupled up at short notice to suit especial requirements.—Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford. 5225b

ELECTRIC motors, dynamos, alternators and motor generator sets of all sizes. We hold one of the largest stocks in England. New and reconditioned, with 12 months' guarantee.—Britannia Manufacturing Co. Ltd., Britannia Walk, London, N.1 (Clerkenwell 5512, 3 lines); also Works and Stores, Chobham, Surrey. 20

ELECTRIC motors, generators, control gear, transformers, A.C. and D.C., new and reconditioned; all covered with our usual 12 months' guarantee; large stocks available.—Electropower Co. Ltd., Kingsbury Wks., Kingsbury Rd., London, N.W.9 (Colindale 4621-2). 42

ELECTRIC motors, generators, motor generator sets, transformers, switchgear, etc., large comprehensive stock, overhauled and guaranteed. Copy of our Register, "Electrical Surplus," containing thousands of items of electrical plant, sent on request.—R. F. Winder Ltd., Belgrave Electrical Works, Leeds, 2. 54

ELECTRICIANS. Send for details Shaftesbury lightweight "Bantam" ladders. Top sections fitted with patent moulded rubber blocks, eliminate possibility of scratching or marking walls, fascias, and other painted or highly polished surfaces. Also available for immediate delivery, steps, platform steps, trestles, telescopic trestles, pole and builders-type ladders, and all sizes of two and three-section extension ladders.—Shaftesbury Ladders Ltd. (E. R.), 453, Katherine Road, London, E.7 (Phone: Grangewood 3363/4). 23

ELLISON: 5 off 300 a., T.P. C/O switches, 1 off 300 a., T.P. N, C/O, 12 off 60 a., T.P. C/O. Latest type, as new. Various T.P. circuit breakers including, 450 a., 300 a., 250 a., and smaller.—J. S. Ramsbottom & Co. Ltd., Keighley. 64

FERGUSON Pailin type B.V.4, 11-kV, 3-phase, 50 cycles, 400-ampere oil immersed circuit breaker.—Whitefield Machinery & Plant Limited, Cobden Street, Salford, 6 (Tel. Pen. 4746). 5137

FLUORESCENT Berleon fittings and control units. Data on request.—H. Strong & Son Ltd., 20-21, Church La., London, N.W.10. 219

FLUORESCENT fittings and control gear for home and export. Wide range competitively priced. Catalogues from — Rada, 148-150, Curtain Road, London, E.C.2 (Shoreditch 8275, 4 lines). 237

FLUORESCENT fittings, lamps, starters and control gear for home and export. Fully guaranteed by actual manufacturers. Send for catalogues. — The Anglo - American Electrical Company, Olive Street, Bury, Lancs. 245

FLUORESCENT tube renewal service. New guaranteed fluorescent tubes (to British standard specification) supplied at 7s. per 5-ft. tube and 6s. 4d. per 4-ft. tube against return of old used tubes.—Fluorescent Starters Ltd., Springfield Road, Guiseley, Leeds. 76

FOR sale, three 1,000-kW diesel sets, each 400/3/50, with all equipment for complete power station.—Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford. 5225

FOR sale, 20 Bratt Colbran 1-kW electric panel fires, £5 5s. each.—Phone Staines 4102. 5227

GENERATING sets, petrol and diesel-driven, up to 30 kVA, new and reconditioned. Plants built to special requirements; consult us without obligation.—Powerco Ltd., Wandsworth Town Stn., York Rd., London, S.W.18 (VANdyke 5234). 153

GENERATING sets, petrol engine-driven alternators, 220/240 volts, single-phase and 3-phase. — Britannia Manufacturing Co. Ltd., Britannia Walk, London, N.1. 19

GENERATING sets, petrol engine-driven dynamos, 110 volts and 220-440 volts, direct current. — Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1. 18

HOUSE service meters.—The Electric Meter Co., Dept. ER46, Castle Circus House, Torquay. 7629

HOUSE service meters, C. & H., Aron, E.A.C., 20-240 v. A.C., s.-ph., 50 c., 2½ amps., 7s. 6d. each, 1s. 6d. postage; 5 amps., 17s. 6d. — Universal Electrical, 217-221, City Road, London, E.C.1. 28

IMMEDIATE delivery new 330-kVA, 400-volt, 3-phase, 50-cycle, 4-wire B.T.H. alternator direct coupled to 400-h.p. Paxman diesel engine, 1,000 r.p.m., complete with switchboard and A.V.R. control.—C. J. Ferguson & Sons Ltd., 33, Barbican, London, E.C.1 (Monarch 5474/5). 104

MERCURY switches are made by Hall, Drysdale & Co. Ltd., of 58, Commerce Road, Wood Green, London, N.22 (Tel. Bow 7221). 182

METERS, reconditioned, all types, AC/DC, quarterly credit, single or three-phase, 3/4-wire, 2½/100-amp. Prepayment single, dual and triple coin, fixed or variable tariff, 2½/50-amp. Delivery ex stock, guaranteed, free catalogue lists 200 types. Trade discount 33⅓%.—The Electric Meter Co., Dept. ER/46, Castle Circus House, Torquay (Tel. 7963). 7626

MORRISON automatic A.C. lighting and power plant, 3 kW, diesel driven. No batteries required. £150. Excellent running order. Selling because mains now available.—Walker, Gambledown Farm, Sherfield English, Hampshire. 7624

MOTOR generator sets and converters, all sizes and voltages from ½ kW up to 500 kW in stock.—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, City Road, London, N.1 (Tel. Clerkenwell 5512, 5513 & 5514). 12

MOTORS. Large stock all types, reconditioned, at one half makers' price, ¼ to 205 h.p. Switchgear available.—J. S. Ramsbottom & Co. Ltd., Keighley (3744/5/6). 46

M.V. type K.O.B. metalclad, single busbar, horizontal draw-out type switchgear, 3-phase, 50 cycles. Rated breaking capacity 100 MVA at 6.6 kV. 11 units for disposal in good serviceable condition. For full particulars apply —Box 5231.

NAMEPLATES, engraving, diesinking, stencils. — Stilwell & Sons Ltd., 153, Far Gosford Street, Coventry. 22

NEW 12.5-kVA, 380/400/3/50 Lister diesel set, 1,000 r.p.m., radiator for tropics, switchboard, cancelled export.—Fyfe, Wilson & Co. Ltd., Station Wks., Bishop's Stortford. 5225c

ONE mercury arc rectifier, 3 phase, 50 cycles. Output 450 kW, 230 volts D.C., 2 wires, complete installation.—Box 5138.

PAPER cables, most sizes in stock at competitive prices.—E. M. Tatton & Co. Ltd., Kew Bridge, Brentford (EAL. 3155). 117

PILOT motors, single to three-phase, various sizes up to 90 h.p.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 34

PLATING dynamos and motor generator sets, various sizes from 500 amps. up to 2,000 amps., with A.C. or D.C. motors.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 15

POLYPHASE kilowatt hour meters. Available from stock.—Universal Electrical, 221, City Road, London, E.C.1. 72

POLYPHASE 3/4-wire meters.—The Electric Meter Co., Dept. ER46, Castle Circus House, Torquay. 7630

PREPAYMENT 1s. slot house service meters. —Universal Electrical, 217-221, City Road, London, E.C.1. 27

PURLEY chokes and ballasts. Our 80-w. tapped h.p.f. ballast with starter switch-holder incorporated is proving itself the most popular unit. Suitable for most fittings. 57s. 6d. each subject.—F. W. Blanshard Ltd. (Dept. ER), Purley, Surrey (Uplands 4818/9). 52

PREPAYMENT meters.—The Electric Meter Co., Dept. ER46, Castle Circus House, Torquay. 7631

ROTARY converters in stock, all sizes; enquiries invited. — Universal Electrical, 221, City Road, London, E.C.1. 25

SLOW speed geared motors, any h.p., any speed, from stock, slipring and squirrel cage, 1 h.p. to 250 h.p.; new and s. hand.—Richard Wilson, Thornhill Elect. Works, Bradford Road, Stanningley, Nr. Leeds (Tele. Pudsey 4291/2). 106

STARTERS, 80 h.p., 230 v. D.C., cubicle type, brand new, 2 off.—J. S. Ramsbottom & Co. Ltd., Keighley. 45

TIME switches for sale. Reconditioned or new. Immediate delivery; 12 months' guarantee. Lists from — J. W. Hughes, 3, St. Thomas Street, London Bridge, London, S.E.1 (Tel. Hop 2759). 241

TRANSFORMERS, new and secondhand, all voltages up to 10 kVA; also 50 kVA, 9,000/220/3/50, £95; 200 kVA, 400/200/3/50, £195.—Powerco Ltd., Wandsworth Town Station, York Rd., London, S.W.18 (VANdyke 5234). 152

VENNER time switches, 200-240 v. A.C./D.C., 10-50 amps., from stock.—Universal Electrical Co., 221, City Rd., London, E.C.1. 29

WARD Leonard motor generator sets, all sizes.—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1 (Tel. Clerkenwell 5512). 10

WELDING dynamos and welding sets for sale.—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1. 11

WELDING generator sets. 3-ph., 50-cy., 400-volt motor coupled to 10-volt, 400-amp. D.C. generator. Extractor fans, Keith Blackman, 400/440 volts, 3-ph., totally enclosed. 50-cy., 950-r.p.m. flameproof motor with 15" fan. Few only.—Leslie Dixon & Co., 214, Queenstown Rd., Battersea, London, S.W.8. 5178

WELDING 150-amp. generators, 1,500/2,000 r.p.m., 85/65 v., Mawdsley, unused, foot mounted, B.B., £65 ea.—Powerco, Wandsworth Town Station, York Road, London, S.W.18 (Vandyke 5234). 148

12½-h.p., B.T.H. variable speed commutator motor, 1,500/215 r.p.m., 400 volts, 3 phase, 50 cycles, with motor operated brush gear, control panel and separate push button station. £250.—Box 5135.

55-kW diesel set, 440/3/50 (1947). Steam and diesel engines, pumps, autoclaves, tanks, pans, condensers, coolers, etc.—Phone 98 Staines; Harry H. Gardam & Co. Ltd. 60

400-cycle, 230-volt, 1,500-r.p.m. new G.E.C. alternators.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1 (CLErkenwell 5512). 39

ARTICLES WANTED

WANTED: TOOLS AND STOCKS

COMPLETE sets of tools to produce components for electrical and hardware trades. Good prices will be paid for tools in good condition, either press or moulding tools, or both. We are also interested in redundant stocks of components or finished goods. Fair prices will be paid for good quality lines.—Box 234.

ALTERNATOR, 150 kVA or nearest, 400 volts, 3 phase, 50 cycles, 4 wires, 750 or lower r.p.m. Complete with switchboard. Must be modern machine.—Box 5139.

COPPER wire, enamelled, D.C.C., etc., nickel chrome. Surplus stocks wanted. — Porchester Electrical Ltd., 15/16, Gerrard Street, London, W.1 (Gerrard 7942). 83

DIESEL engines or diesel-driven generator sets, 100 kW up to 400 kW, slow speed preferred.—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1. 14

MERCURY arc rectifier. Input 400 volts, 3 phase, 50 cycles. Output 460 volts, D.C., 70 amperes.—Box 5140.

MERCURY (Quicksilver) wanted. Write for packing instructions. Gold, silver and platinum also purchased.—Collingridge & Co. Ltd., Riverside Works, Riverside Rd., Watford (Tel. 5963). 30

REORGANISED company aiming to manufacture 15,000 industrial fluorescent fittings per year requires competitively priced control gear, starters and accessories. Quotations invited for chokes (mainly 80 w.) in 1,500 lots and other components in 5,000 lots.—Box 7617.

SURPLUS laminations, enamel copper wire, screws, nuts, flex. Good prices paid. Full details to—Box 201.

WANTED, D.C. and A.C. ball-bearing motors, motor generator sets, dynamos and alternators. Full details to — Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1. 13

WANTED for prompt cash, ferrous and non-ferrous scrap, also plant for dismantling. Buyers of secondhand machinery and plant for re-use.—W. & H. Cooper Ltd., 176, Brady St., Bethnal Green, London, E.1. 32

WANTED, one Siemens-Schuckert variable speed, 440-v., 50-cycle, 3-ph. commutator type motor with hand-operated brushgear, 1.85 kW at 2,000 revs. down to .1 kW at 100 revs.—Electric Power Plant Co., Preston Street, Lenton, Nottingham. 5154

WANTED, rectifier, 230v. A.C. input, 230v. D.C. output, 1 amp. — Universal Electrical, 221, City Rd., London, E.C.1. 5202

WANTED, rotary converters, any sizes.—Universal, 221, City Rd., London, E.C.1. 26

WANTED, transformer, input 400/440/1/50, output 50/100 kVA, 40 volts. Transformer which can be altered or rewound considered.—Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford. 5226a

WANTED, 1 300-h.p. motor generator set, 1,000 or 1,500 r.p.m., 440/3/50 to 440 D.C. output, or 250/300-kW, 440-v. generator. —John Godden (Stoke) Ltd., Kingsway, Stoke-on-Trent. 5201

WANTED, 75-kVA alternator, 230/3/50 at 250 r.p.m. or frame suitable. Alternatively 60 kW, D.C., 480 volts, 3-wire, 250 r.p.m. —Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford. 5226

WANTED, 300-kVA alternator, 400/440/3/50 at 375 r.p.m. Alternatively 3,300 volts. Condition immaterial as long as mechanically sound.—Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford. 5226b

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DESIGN required for fractional h.p. motor for special applications. Payment according to efficiency results. We are able to do all necessary trial models and testing. Only designers able to prove ability should apply to—Box 5237.

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AGENT wanted for South-Western Counties, Wales, Scotland, Ireland, by transformer manufacturers.—Avis & Baggs Ltd., Gosbrook Road, Caversham, Reading. 162

AGENTS required in several districts. Live connections with electricity boards, wholesalers and trade essential. — Eltron (London) Ltd., Strathmore Road, Croydon. 5166

FIRST-class electrical dealers wishing to be appointed sole Stitchmaster agents should write to — Fridor (G.B.) Ltd., 66, Victoria Street, London, S.W.1. 5026

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PATENT NOTICES

NOTICE is hereby given that Compagnie Generale de Telegraphie Sans Fil seeks leave to amend the complete specification of the application for Letters Patent No. 712017 for an invention entitled "Improvements in or relating to Tubular Condensers." Particulars of the proposed amendments were set forth in the Official Journal (Patents), No. 3423, dated 22nd September, 1954. Any person may give Notice of Opposition to the amendment by leaving Patents Form No. 36 at the Patent Office, 25, Southampton Buildings, London, W.C.2, on or before 22nd October, 1954.—J. L. Girling, Comptroller-General. 5180

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NIGERIAN ELECTRICITY SUPPLY CORPORATION

Good Results

THE Twenty-fifth Annual General Meeting of the Nigerian Electricity Supply Corporation Limited was held on 21st September in London. Mr. George Hemmant, C.M.G., chairman, presided.

The following is an extract from the Chairman's circulated review:—

The directors' report and the accounts for the year ended on 28th February, 1954, have been in your hands for some time and you will have noted the small reduction of £3,696 in the revenue from power sales.

The number of units sold was 56,286,477, compared with 59,503,037 in the previous year, a reduction of 3,216,560 units. The relatively small reduction in the revenue from power sales was due to the fact that the present rather higher rates charged for power were introduced in April, 1952, and were thus in force for only 11 months of the previous year.

Prolonged 1952-53 Dry Season

The reduction in the number of units sold was due largely to a prolonged 1952-53 dry season and its effect upon our reserves of water power in April and May of the year under review. The recent completion of the Jekko 2 power station will enable us to generate more power from the same water, or the same power from less water, and thus counteract the effects of a prolonged dry season.

The last essential component of the plant and machinery for the Jekko 2 power station was not delivered on the Plateau in Nigeria until February 2, 1954, and great credit is due to the Manager and his staff who brought the new station into service on the last day of that month.

The following figures of units sold at the end of the last three dry seasons may be of interest:—

April-May, 1952.	Units.
No prolonged dry season ...	9,135,357
April-May, 1953.	
Prolonged dry season ...	7,978,874
April-May, 1954.	
Jekko 2 station in operation	9,630,598

Power sales in April-May, 1954, realised £46,007 compared with £40,057 in April-May, 1953.

The Jekko 2 power station, in addition to its value in enabling the corporation to meet present demands in the dry season, will also be a most useful asset as a general reserve of power, permitting the necessary overhaul of machinery throughout the system.

Considerable trouble was experienced during the year with the buckets of the pelton wheel at Jekko 1 power station and culminated in a temporary breakdown of the turbine in December. Repairs were quickly effected with the invaluable assistance of the General Manager of Amalgamated Tin Mines of Nigeria Limited, to whom we are much indebted. A new solid wheel cast with its buckets, which had been ordered over a year before this breakdown, has now been installed, and future trouble with the buckets is not anticipated.

Power sales to our smaller consumers showed a general increase, and bulk sales to the Electricity Corporation of Nigeria now represent 10% of our total power sales.

Operational costs rose by £13,000, of which about £7,000 was due to heavier maintenance work and higher wages. The work of maintaining an extensive system of water conservation in a country subject to tropical storms of great violence must be expected to vary from year to year. Labour costs were increased by the introduction towards the end of the previous year of a higher cost-of-living allowance which has since been incorporated in basic wages.

An additional £15,000 has been provided for depreciation, and the appropriation of £20,000 for plant replacement reserve has been repeated. The usual dividend and bonus are recommended and the balance carried forward will be increased by £2,000.

The report and accounts were adopted. 5181

THORN ELECTRICAL INDUSTRIES

A Record Year

THE Eighteenth Annual Ordinary General Meeting of Thorn Electrical Industries Ltd. was held on 17th September in London. Mr. Jules Thorn (Chairman and Managing Director) presided and in the course of his speech said:—

The results indicate satisfactory progress by the Group. The trading profit, at £1,054,348, has increased by £283,000, and the net profit before taxation amounts to £778,306, exceeding the previous year's earnings by more than £230,000. Taxation, at £462,740, again absorbs more than 60% of the net profit.

The reserves of the Group now stand at £1,118,812 and exceed the total issued capital.

Progress during the year in the Atlas Lighting Division has been remarkable, and apart from the increased popularity of all Atlas products we have been fortuate in securing very substantial contracts from the Government.

Our lighting subsidiaries have continued to make a valuable contribution to the prominent position which we hold in the lighting industry.

In the export field distribution of the company's products has continued to expand, particularly in Commonwealth and "Sterling" countries. Export sales have increased by approximately 40%.

Ferguson Radio and Television Division enjoyed another record year, the turnover reaching a new high level.

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I have always resisted the temptation to make optimistic forecasts, but all are now beginning to reap the benefits of the large investments and the hard work which for some years have gone into our research, development and manufacturing resources. The report was adopted and a dividend of 20% approved. 5182

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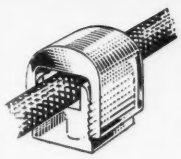

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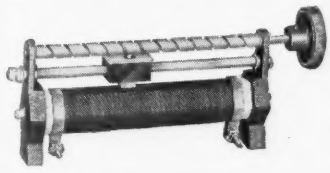

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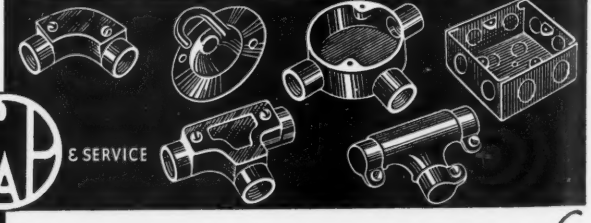

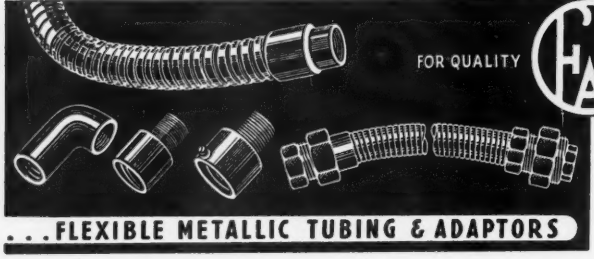

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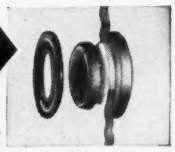

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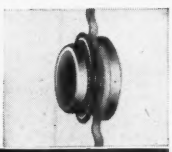

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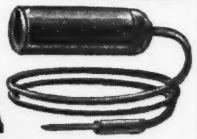

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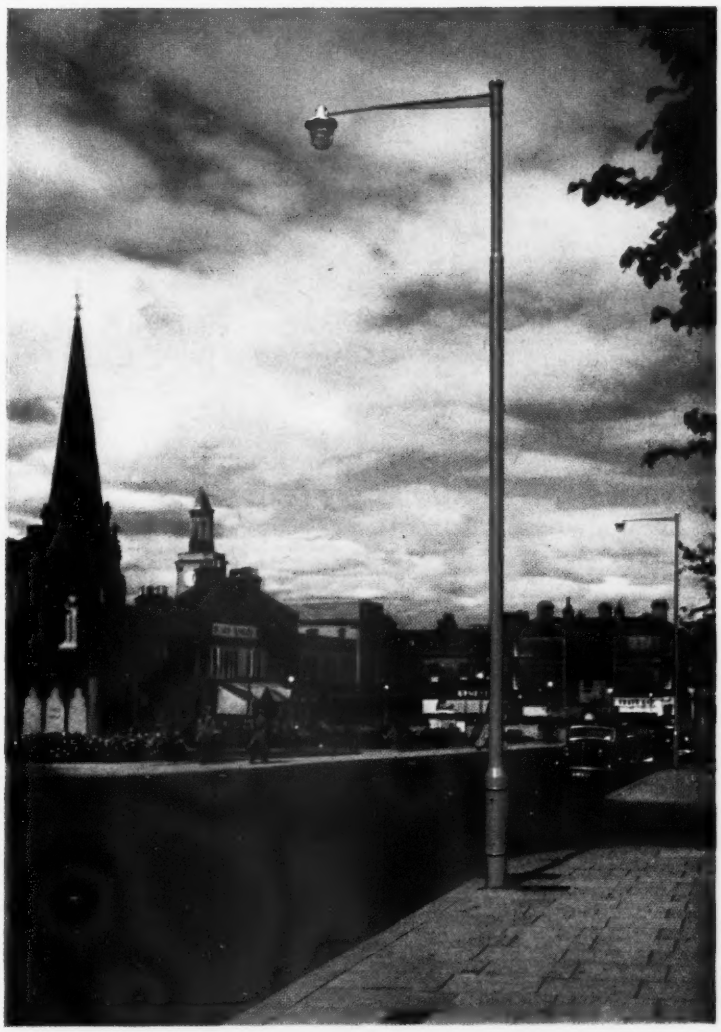

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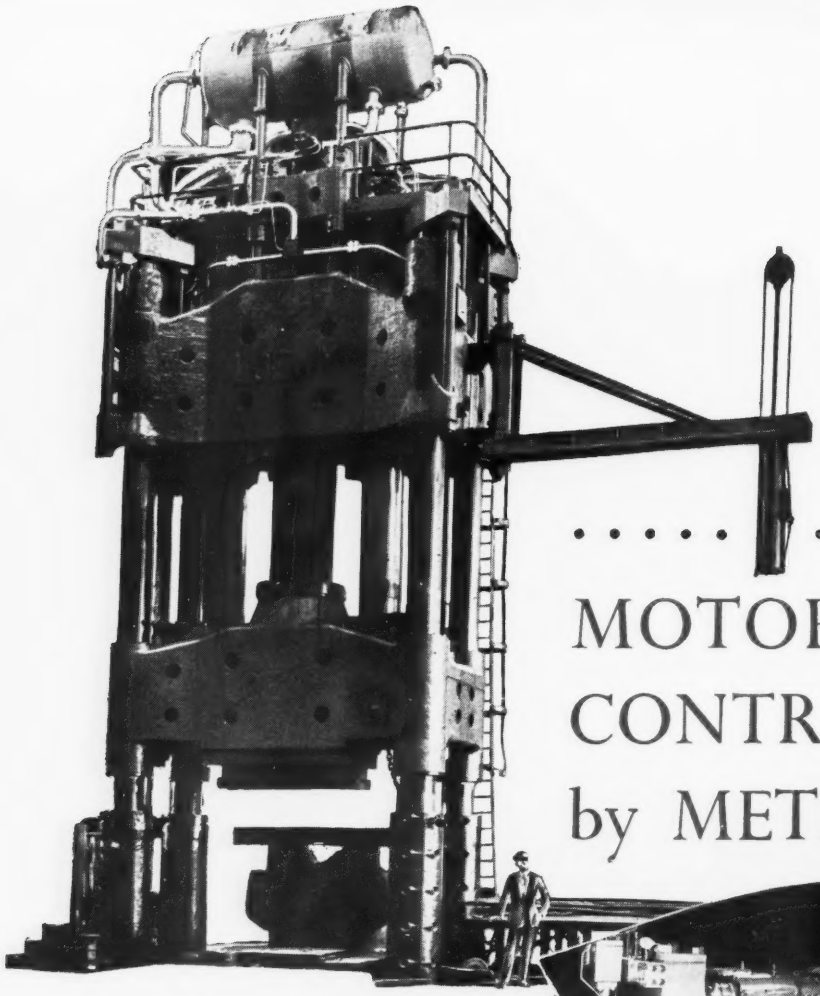
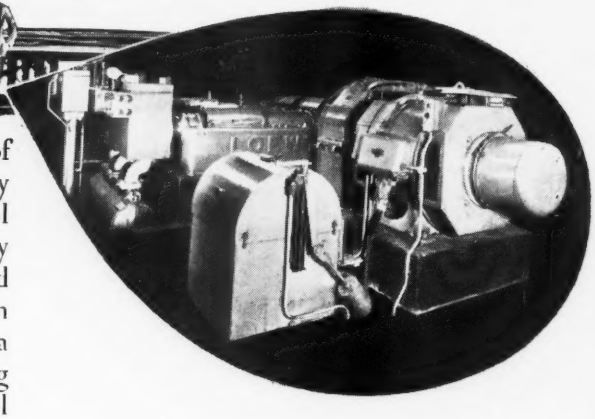


.....with MOTORS and CONTROL GEAR by METROVICK



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